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softalk

for the IBM Personal Computer

USER GROUP UPDATE

THE HYPERION REVIEWED

ASHTON-TATE'S 'FRAMEWORK'

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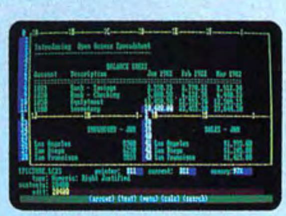

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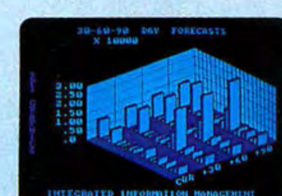

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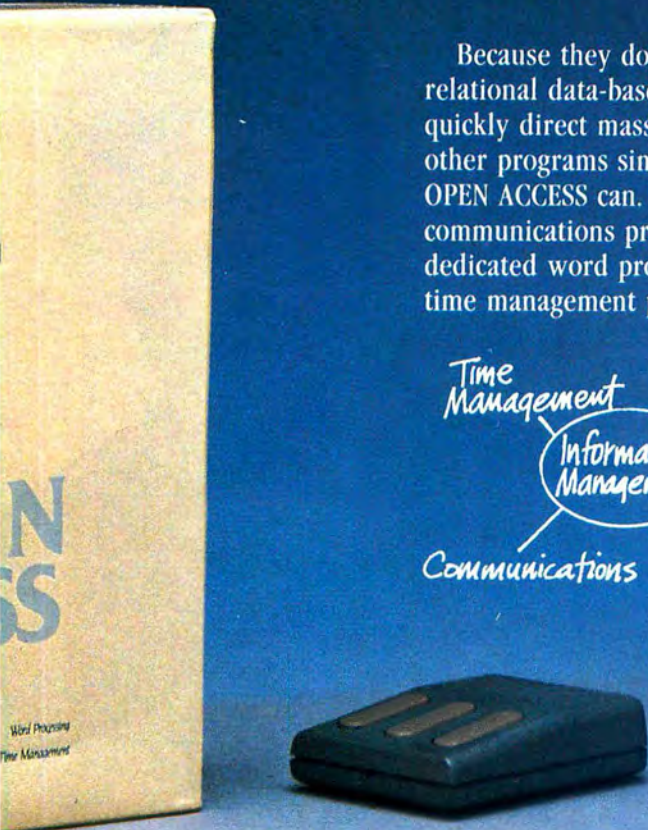

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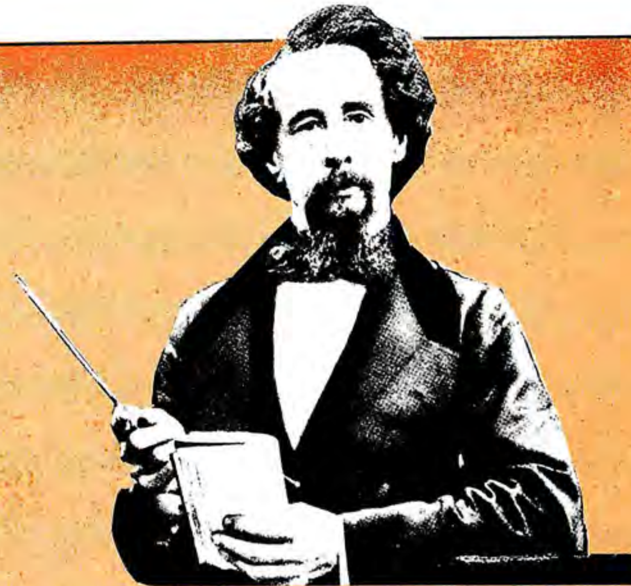

PCwick Papers

I wants to make your flesh creep. This month's contest takes a literary Twist. The object is simple: Identify all fifteen quotations from the works of that master of the nineteenth-century novel, Mr. Charles Dickens (just think what he would have done with a word processor!). There is some credit in being jolly. All the quotes can be found on this page and in another page of the magazine. But which other page? "I am ruminating," said Mr. Pickwick, "on the strange mutability of human affairs."

To win $100 in software (Oliver Twist has asked for more!) from advertisers in these pages, send us your list of the quotes and the works they came from to Boz and Phiz, Softalk for the IBM PC, Box 7040, North Hollywood, CA 91605. Be sure to include your name, phone number, address, software desired, and your nearest dealer. It is a melancholy truth that even great men have their poor relations.

THINK! AGAIN

For those of you who have attempted to solve the puzzle in the April "Think" contest, we feel it's only fair to warn you that somewhere between the twisted minds of the contest editors and the printing of the magazine, three letters vanished. These were a "C" from the middle-right box, an "A" from the left-bottom box, and a "B" from the bottom box. To their credit, some entrants assumed that we did this on purpose and congratulated us on our cleverness.

Anyhow, if you feel that the absence of the three frontrunners of our alphabet compromised your entry, feel free to reenter. And for those of you who haven't entered yet, we're going to extend the deadline another week to May 21, so start thinking! ▲

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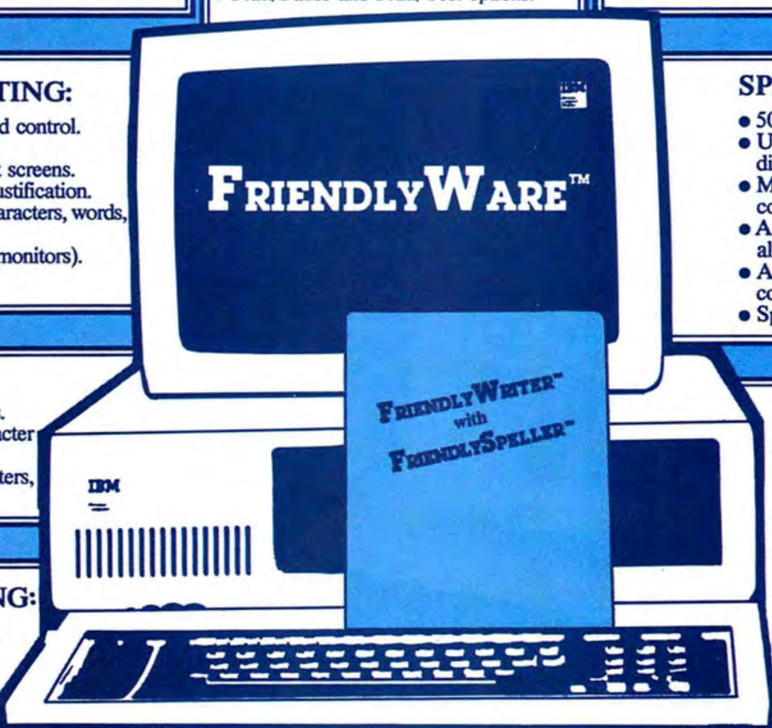

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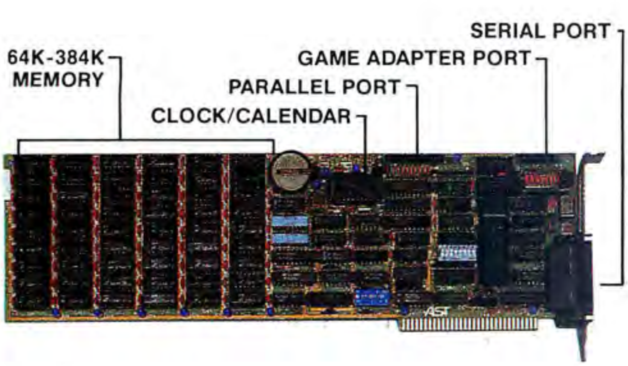

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The Intelligent Printer User

The January 1984 "Printed Word" (by John Dickinson) made me aware that a new and improved manual was included with the Epson FX-80 printer. I followed his advice and wrote Epson America that my printer came with the old manual and that I would like to obtain the newer version, with a bill for same.

Thanks to their customer service department, the new manual arrived within a short time with no bill. My free subscription to *Softalk* has more than paid for itself. Many thanks.

Frank Weiner, San Jose, CA

Taming the Display Screen

I find Howard Glosser's "BASIC/Assembly Line" very, very useful. I am trying to teach myself BASIC programming and his articles help in an otherwise neglected area.

I have a question about "Taming the Display Screen" (November 1983). What changes would I need to make to the program to save the screen using a monitor (monochrome or color) hooked to the color/graphics board? I am interested in graphics programming for educational programs. I think this method may be useful here.

Thank you for the great articles—I feel much better having a closer look at how things actually get done—mixing BASIC and assembly language is wonderful.

Cheryl L. Ellis, Farmington Hills, MI

Howard Glosser replies: *The program can be fairly easily adapted for the color monitor, but there are three main areas that require changes.*

First, define the buffer address for the save/restore to point to the color/graphics adapter (&HB800) instead of the monochrome display (&HB000). Referring to figure 2 in the article, change the following lines of code:

```
390 DATA  &H06,&HB8,&H00,&HB8,
          &H8E,&HD8,&HBE,&H00
420 DATA  &H00,&HB8,&H8E,&HC0,
          &HBF,&H00,&H00,&HB9
440 DATA  &H04,&H00,&H1D92
```

Second, if you are using a PC that has both a monochrome and color display, add the following code to the BASIC program in figure 3:

```
122 DEF SEG = 0 : POKE &H410,
      (PEEK(&H410) AND &HCF)
      OR &H10
124 SCREEN 1,0,0,0:SCREEN 0
126 WIDTH 80
```

This code, taken directly from the BASIC manual (Section I-8) will automatically swap to the color monitor when the demo program for Screen Handler *is run.*

Finally, in figure 3, any time locate *statements are used that modify the cursor size (block cursor or split), they must be changed for the color monitor. The bottom scan line for the monochrome display is 13, whereas on the color/graphics adapter it is 7. Therefore, change the following lines:*

```
110 COLOR 7,0 : LOCATE ,,0,6,7 :
     CLS
840 COLOR 7,0 : LOCATE ,,1,6,7
960 LOCATE ,,,6,7 : GOTO 990  'Regular
970 LOCATE ,,,0,7 : GOTO 990  'Block
980 LOCATE ,,,7,0
1690 LOCATE 22,27,1,7,0
1710 LOCATE ,,0,6,7 : COLOR 7,0 :
      HELP% = SAVHELP%
```

If you run the demonstration with a color monitor, everything should work just fine. You may notice, however, a momentary flash of garbage as the store and restore of the screen occurs. This is due to a screen retrace. There are two ways to eliminate this. The first involves rewriting the assembly language subroutine to synchronize the placement of the data into the buffer with the retrace. The second is to change line 126 to read width 40, *setting the screen to a forty-column display. If you run the example now, you'll notice that the flashing is gone. However, you'll also notice that the program was not written for a forty-column screen; as the text is displayed the screen scrolls. So, while we fix one problem, we create another.*

Beta Testers Needed

I am developing analysis of variance and multiple regression packages for the PC and want to find a few people interested in serving as beta testers for them. To do this you would have to have a two-drive system, 128K of RAM, and graphics capability; some knowledge of analysis of variance or multiple regression; and a willingness to create data files and test the programs extensively. The quid pro quo: free copies of the programs and documentation when they are published later this year. Any interested parties should write to me at 10754 Kelmore Street, Culver City, CA 90230; indicate whether you are interested in the analysis of variance or multiple regression program.

Stephen Madigan, Culver City, CA

Open Just a Little Wider, Please

As a computer consultant whose husband is an oral surgeon, I have been seeking an oral surgery office management system for the XT to use in his office. Oral surgeons' needs are unique in the medical field, since their systems

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must be able to handle both dental insurance forms and medical insurance forms. So far, all the systems I have reviewed have been either poorly written or have failed to address the oral surgeon's special needs. Have any of your readers found a good office management system that would fill the requirements of an oral surgeon? Since I also serve as a consultant to some other dentists and physicians, I would be interested in knowing if any of your readers are currently using medical or dental office management systems that they are truly satisfied with. Unfortunately the market is saturated with substandard medical and dental packages for which unsuspecting and computer-illiterate physicians and dentists are easy prey.

Gail D. Gregg, Blacksburg, VA

More Science

I am happy to see the "Analytical Engine" series. I am a graduate student in (I hope) my last semester in ocean engineering (actually, a little naval architecture, a little marine engineering, and a little of a few other things). People are just beginning to see that the PC has the capability to run many programs once thought to be too big to run on a microcomputer. I hope that Ed Bogucz will cover such topics as who is writing and selling scientifically oriented software, the existence of or prospects for such things as EISPACK, Scientific Subroutines Package, and IMSL for the PC, scientific applications written in languages such as C or PL/1, both of which have features that make them better for writing a greater range of programs, including number-crunching programs. (Do you realize what it takes to implement what ought to be a recursive algorithm in a nonrecursive language?)

I am also happy to see "C Spot." C is my choice for a general-purpose programming language for my PC; I know enough C to realize that it's more transportable than the different implementations of Pascal and cleaner than BASIC for big programs I may want to keep around awhile.

Wes Taylor, Seattle, WA

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Tired of Unsightly Echo Command Debris?

When using DOS 2.0 with the *echo off* subcommand, you may have had the frustrating experience of getting unwanted messages because turning the echo off doesn't quite suppress everything. For example, if you enter the following into a batch file and name it Copyfile.bat,

```
ECHO OFF
COPY BASICA.COM B:
ECHO ON
```

this message will appear on the screen while the batch file executes:

```
1 File(s) copied
```

To get rid of this message as well as others that might appear (even with echo off), redirect any output messages from the copy to a *nul* device:

```
ECHO OFF
COPY BASICA.COM B: >NUL
ECHO ON
```

If you run this batch file again, no message appears at all!

Howard Glosser, Medford, OR

BASIC Appreciation

Most of us out here are using BASIC, and I appreciate your emphasis on it. The series last year on minimizing garbage collection was very good. Howard Glosser's "BASIC/Assembly Line" stories are good too, especially the article on reading the disk directory from BASIC (January 1984). I'd like to request a program similar to Glosser's that reports how much free space remains on disk. I have several projects that involve making many additions to a rather long file, then saving the file for later use. It's very annoying to get a "Disk Full" error after the fact—I'd like to be able to check on how much space I have left before I start to write the file.

Next, I'm confused about how programs

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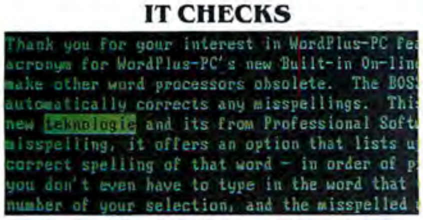
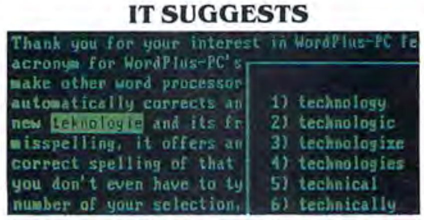


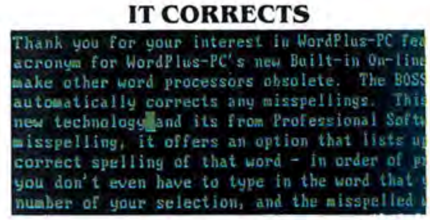
At the touch of a button, virtually anytime during typing or after the creation of a document, The "BOSS" locates and *highlights misspelled words* on your screen. The "BOSS" can even check the spelling of a word directly after it's been typed in.

IT SUGGESTS



When a word is misspelled, the user can ask The "BOSS" for suggestions as to how to correctly spell the word. With only one keystroke, The "BOSS" will display, in a dynamic on-screen window, up to eight *spelling suggestions in the order of probable phonetic correctness.*

IT CORRECTS



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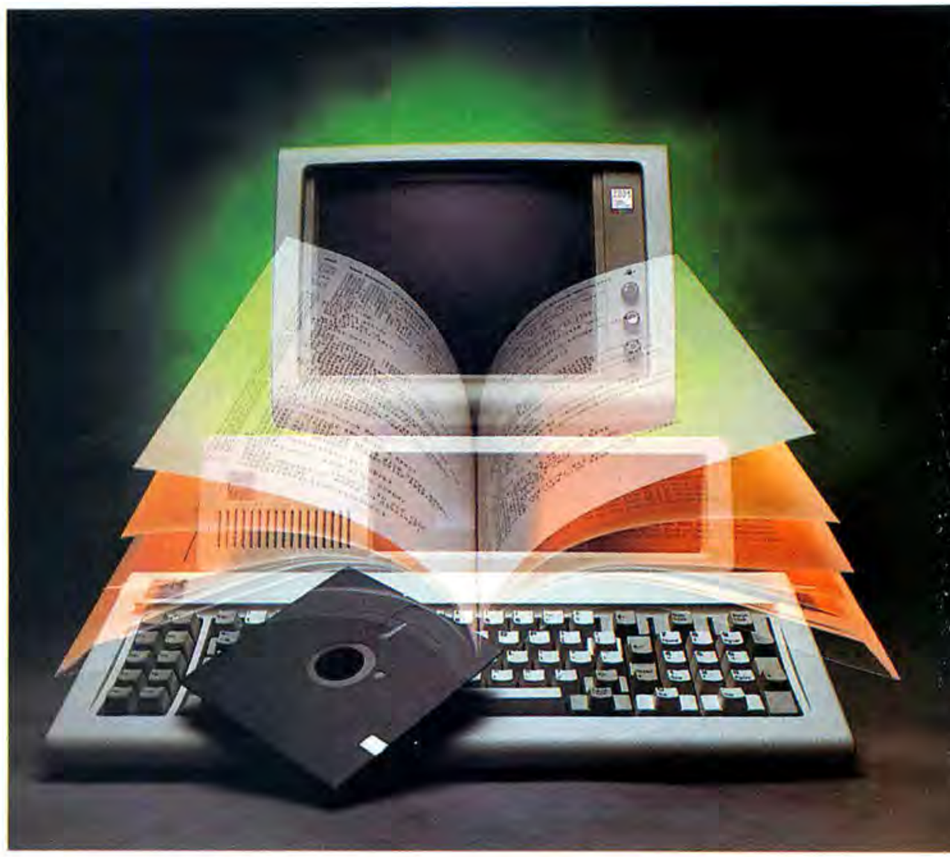

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Peter Norton

This book is the most authoritative companion to the IBM PC* yet written. It illuminates the inner workings of the machine while demonstrating how both beginning and advanced programmers can take advantage of the many features offered by the IBM PC. Norton also explains how the ROM is allocated for BASIC and BIOS. He explores the RAM for functions like the monochrome and color monitor displays and shows how the assembler can be integrated into Pascal and BASIC to access more power for your use.

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Larry Joel Goldstein, Martin Goldstein

This updated edition of the classic introductory book for the IBM PC is written in an easy-to-read, self-study format. It includes two new chapters on BASIC programming. They stress both the importance of structuring and planning programs and important debugging information. Additions to previous chapters include new information on graphics and games and expanded information on random access files.

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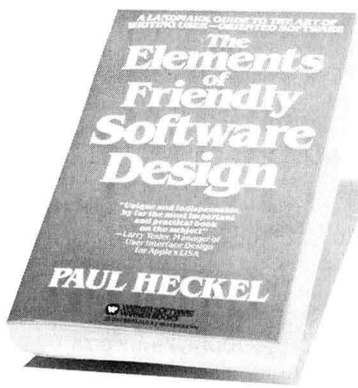

Paul Heckel feels that to be "friendly," software should be visual, interactive, and above all, *communicative.* He first summons up the techniques of the great masters of communication in film, and of painters like Pablo Picasso and writers like Mark Twain. He then adds techniques of his own developed through years of successful software design, including programs for the Craig Language Translator and the all-new Viewdex™ system for the Epson HX-20. The result is a free-wheeling guide that is as delightful and surprising to read as it is easy and practical to use.

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like Glosser's work. I understand the idea of defining a string variable that's long enough to hold the machine language program, finding the appropriate place in memory with *varptr,* and all that. What puzzles me is the content of the machine language file. Glosser's program is 159 bytes long when it's stored on disk as Directry.bas. I took a look at that file just out of curiosity and am confused. The first seven bytes of it aren't in the BASIC data statements of Glosser's program, which creates the file. Where did they come from? Also, the last line of data statements is not in the program file at all. Where did it go?

Allan D. Pratt, Tucson, AZ

Howard Glosser replies: *In regard to your request for a program that returns the amount of space available on a disk, see this month's "BASIC/Assembly Line." Concerning the* bsave, *the mysterious seven bytes, and the missing line of data statements—to start with, get a directory reading of the disk containing the machine language file Directry.bas. Note that the file is 167 bytes long, eight bytes longer than the subroutine that was actually saved. When* bsave *stores the subroutine, it adds eight bytes to the machine language code being placed on disk. You've discovered seven of those bytes at the start of the file.*

FD C0 06 5F FD 9F 00

The first byte, FD, is a signature indicating this is a bsave *file. The next six bytes, in sets of two, are all stored in reverse order. Bytes C0 and 06 indicate the segment that was in effect when* bsave *took place, in this case 06C0 or decimal 1728. That was the address of BASIC's data segment at the time you ran the program, the segment in which Subrt$, the string containing the machine language program, resided. Following this are the offset into the segment FD5F (decimal 64863) and the length of the subroutine—009F (decimal 159). Why does* bsave *add all this extra stuff?*

If you do a bload *on the file and code it simply as* bload Directry *(specifying no* def seg *or offset), BASIC will use the six bytes following the FD to determine its default segment, offset, and file length. The one byte that remains unaccounted for (remember I said eight bytes were added) is the last character on the file, a 1A or* Chr$(26), *which marks the end of file.*

Not-So-Smart Modem

I'd like to warn everyone using the PC, Hayes modem, and *PC-Talk III* to use uppercase letters when entering commands.

I recently changed dialing options from pulse to tone and I inadvertently entered *atdt* in lowercase letters. The result was that the modem would not execute the dial command. Further, the diagnostic program, when run with the modem turned on, returned a *1101 System Error - Bad Serial Port.*

I won't subject you to the dreary details of how I returned the modem and serial port for repairs only to find both to be in excellent working order. I discovered my mistake by accident. When I finally entered *ATDT,* the problem disappeared.

Ward L. Darby, Fullerton, CA

American National Standards Committee Z39

The February 1984 "Tradetalk" refers to a proposed standard cataloguing number and bibliographic convention for microcomputer software.

Our local user group is developing a library of public domain software—applications, utilities, games, whatever. We also include text files containing brief abstracts of reviews of commercial software.

With more than one thousand files already on hand—some interdependent, some updates of prior versions—we need to adopt some cataloguing convention to allow members to quickly search and retrieve software of interest. Search may be by type, topic, date of acquisition, or some other field.

There's no need to reinvent the wheel. Perhaps the Subcommittee of the American National Standards Committee Z39 has what we need. Can you provide the address of this group, or is there any other group that may have addressed this common problem?

Ben Rees, Pebble Beach, CA

You can contact ANSC Z39 at (301) 921-3241 or write them at ANSC Z39 Administration Building, Room E106, U.S. Department of Commerce, National Bureau of Standards, Washington, DC 20234. Has anyone else developed a cataloguing system? If you have, we'd like to know about it.

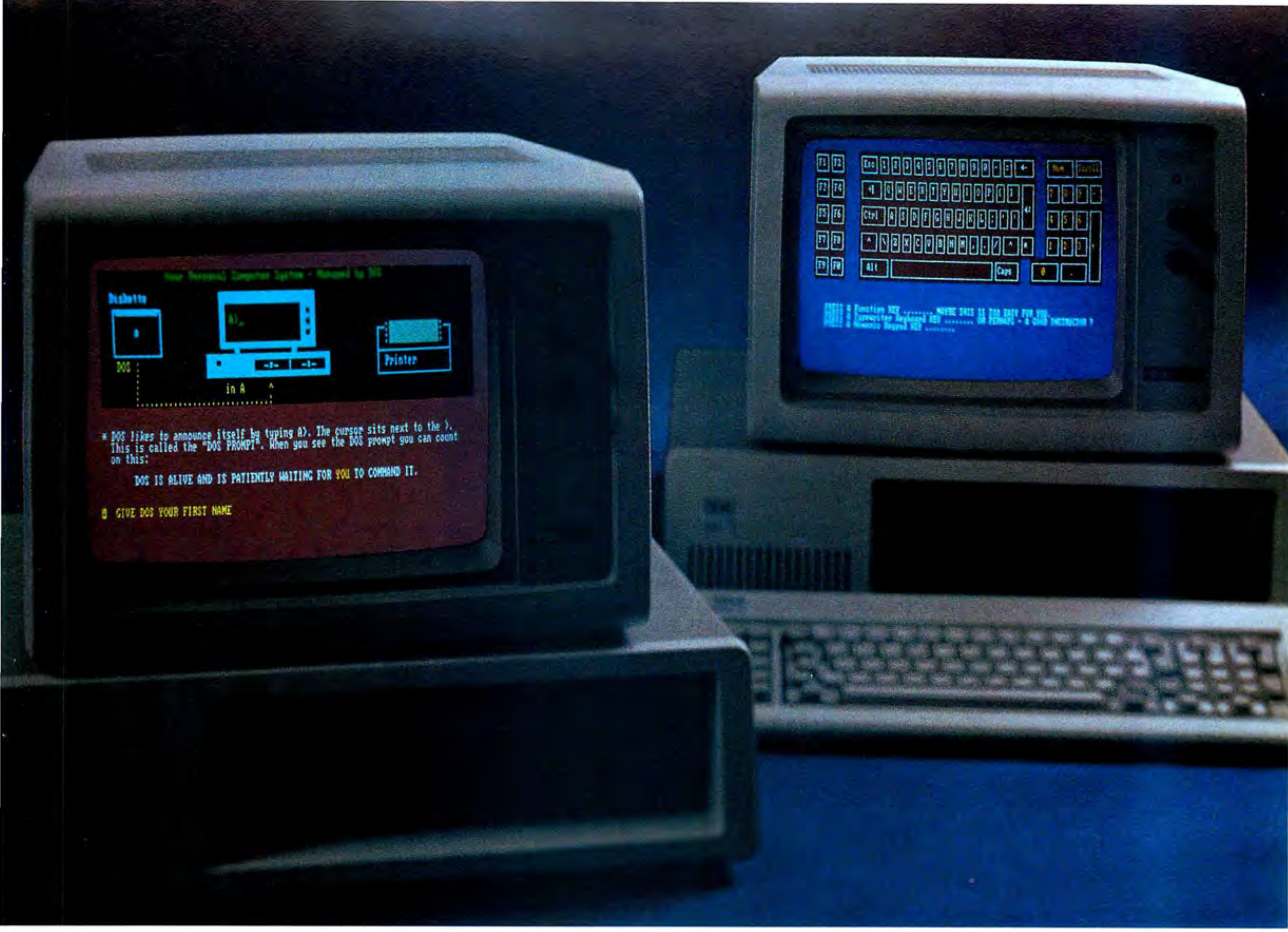
PCs in Owego, Not Oswego

I hope the rest of the information in your January *Softalk* was more accurate than your report on the IBM school computer education program. The school district in Tioga County that was granted the IBM computers was Owego, not Oswego, as you incorrectly stated. Oswego is located a mere one hundred forty miles to the north. It would have been a pleasant experience to see my school district listed correctly.

Lynda G. Johnson, Candor, NY

Pirate or Phantom?

Why do software houses believe that owners of personal computers aren't to be trusted with their programs? If you think about it for a minute, it may occur to you that the IRS trusts most of your fellow Americans, you trust an unknown pilot to ferry you at seven miles above the earth, we even trust taxi drivers to take us the shortest distance between LaGuardia and Manhattan. In this country we generally assume the best of everyone. So why are PC owners as a group treated differently?



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Would you pay five to ten thousand dollars for a new car and then steal floor mats for it? No! Nor would you spend five to ten thousand dollars for a computer and steal software for it. Granted there are car thieves and program thieves, but there are legal means for dealing with both. Copy-protecting programs is not effective at stopping a determined thief, but it's a major inconvenience to the software's user. It stops, for example, the creative improvement and modification of the software by the end user.

Everyone praises Apple and IBM for their open hardware design and attributes their rapid growth to enhancements third parties provide. Most of the hardware that expands personal computers was conceived, designed, and built outside of IBM and Apple. If the programmers who copy-protect their code published it, the new areas of applications and usefulness would be astounding.

Al Hamilton, Springdale, OH ▲

CONTEST WINNERS

Judging the Pea Sea Con Test proved more difficult than we imagined. The effort that most of you poured into your entries left us exhausted just trying to figure out what you were attempting to say. Still, a few entries stood out for their wit, ingenuity, and difficulty of decipherment. From these, our winning entry, submitted by Megan McKenzie, of Las Vegas, Nevada, emerged. It is reproduced herewith in its entirety.

Nay boar hood gang treble inn sued. Ah gang cauled "Ohm" end thee utter cauled "Byte" wear batt link. Loll braking wood peek at knight. Hi on coil Cain, thee Bytes wear weighting fur treble. Won knight they kilt end auld Ohm buoy rite inn day hart. Thee Ohms when burr Zurich—strychnine Bach width canons, pistles, end pix. Thee Bytes wear the mollusk. Buttress knot thee Finnish; thee Bytes wood knot gibbon. Beet, malled, end sic, day hong on, butt day Bytes bit thee big one—sari day knew day Ohms.

More awl: Pow err fowl elect trickle currant awl ways cleans yore cluck.

Honorable mention for most esoteric wordage goes to Forrest Harlow, of San Angelo, Texas. A sample of his tortured verse:

I LUFF MY CROWS

Eye deer lee luff dee ship baste fash beasts.

Far my mine some won sadhe were reel tray Kay leeks.

They adder sub tracked awl in by nary.

They DeWitt so fascist make me fee lee Murray.

Eye loave Ulm so deer, eye awl moas tart pouting,

Wen I trite ootheca how eye woo deck cyst wit outworn.

Let's hope he never writes a novel this way. Stay tuned for the answer to last month's Sir Edmund contest, which already seems to have absorbed many of this nation's valuable man-months. ▲

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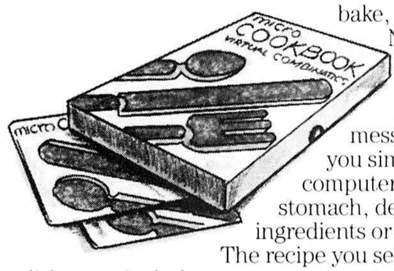

Not only by giving you more than 150 recipes—which it does. But by simplifying the whole art of cooking. You see, Micro Cookbook eliminates messy, confusing recipe files. Instead you simply insert our program into your computer and select any recipe your heart, or stomach, desires. Ask for a recipe by name, ingredients or category.

The recipe you select can be one of the mouth-watering dishes we include—or you can create a diskette of your own favorites. And you can constantly modify your selections, adding new triumphs and removing recipes that, ah, bomb.

These, and Micro Cookbook's other features, will make your life in the kitchen a breeze.

With this in mind, is it any wonder Micro Cookbook makes this guy so nervous?

Versions available for Apple II+, IIe (80 col) and IBM PC (64K, PC DOS). The cost $40. Advanced Functions Package (requires Micro Cookbook) for IBM PC (128K, PC DOS or MS DOS) and Apple II+, IIe (64K, 80 col). The cost $30. Soups & Salads, Appetizers, or Dessert options, $12 each. Check your dealer first. MC/VISA check, phone or mail order accepted. Please specify computer and add $2 handling.

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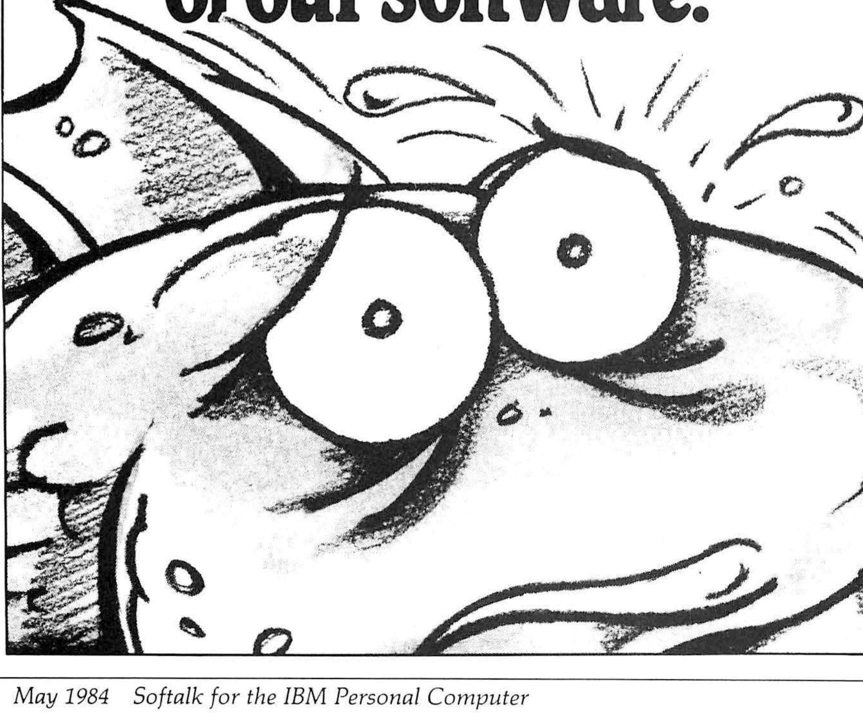

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QUESTIONS & ANSWERS

by Nancy Andrews

Nobody Sperfect. The password program printed in the March "Q&A" (page 18) turned out to be a little too cryptic for anyone's good. Alas, we happened to have renumbered it by hand before printing it—and forgot to renumber the *gosubs* and *gotos*. Here's how that program should have looked:

```
1000 '= = = = = = = = = = = = = = = = = = = = = = = = = = = = = =
1010 '
1020 'Use BASIC 2.0 key trapping to kill Ctrl-Alt-DEL, Ctrl-C, & Ctrl-Break:
1030 '
1040 KEY OFF
1050 KEY 15,CHR$(12) + CHR$(83)        'Ctrl-Alt-DEL
1060 KEY 16,CHR$(4 ) + CHR$(46)        'Ctrl-C
1070 KEY 17,CHR$(4 ) + CHR$(70)        'Ctrl-Break
1080 ON KEY(15) GOSUB 1120 : KEY(15) ON
1090 ON KEY(16) GOSUB 1120 : KEY(16) ON
1100 ON KEY(17) GOSUB 1120 : KEY(17) ON
1110 GOTO 1130
1120 BEEP : PRINT "So there!" : RETURN      'Just eat key
1130 '
1140 '
1150 ' Read in password:
1160 '
1170 OPEN "password.dat" FOR INPUT AS 1
1180 LINE INPUT#1,PASSWORD$
1190 CLOSE
1200 '
1210 ' Check user's password entry one char at a time, as entered:
1220 '
1230 WHILE INKEY$ <> "" : WEND
1240 CLS : PRINT "enter password:"
1250 TRY = 0
1260 I = 1
1270 A$ = INKEY$ : IF A$ = "" THEN 1270
1280 IF A$ = "}" THEN 1330
1290 IF MID$(PASSWORD$,I,1) <> A$ THEN GOTO 1340
1300 IF I = LEN(PASSWORD$) THEN GOTO 1270
1310 I = I + 1 : IF I > LEN(PASSWORD$) + 1 THEN GOTO 1340
1320 GOTO 1270
1330 PRINT : PRINT "Welcome!" : SYSTEM
1340 'destroy system!
1350 TRY = TRY + 1
1360 IF TRY < 3 THEN PRINT "Wrong! Try again from start of password." : GOTO 1260
1370 CLS : LOCATE 12,36 : PRINT "— death —"
1380 DEF SEG = 0
1390 FOR I = 0 TO 32767 : POKE I,0 : NEXT
```

Q: My company needs to locate a software package that can handle a bulletin board system and/or some company or person willing to share or sell their already-existing system to us.

I recently tried to develop the system using *Crosstalk*, but its script files and command files aren't capable of handling our system's complex requirements. What we need to do is leave our XT on for a couple of hours during the evening so that our different divisions can dial up and download or upload files between the XT and their PCs. The system needs to be menu-driven so the user doesn't have to know much about the software to operate it. Do you know of any software packages that will handle these requirements?

Mark A. Alviani

A: Larry Jordan reviewed six bulletin board systems in the February issue of *PC World* that look like they might meet your needs. *Hostcomm* (Janadon, Fairfax, VA), *Intelliterm* (Microcorp, Philadelphia, PA), *MultiLink* (The Software Link, Atlanta, GA), *PCS/2000* (Microcom, Norwood, MA), and *Remote Access* (Custom Software, Bedford, TX) are commercial systems and one, *RBBS-PC*, is a public domain package. Jordan can be reached via the Capital PC User Group bulletin board; their number is (301) 251-6293. By the way, they use *RBBS-PC*, as does a San Francisco-area bulletin board whose number is (415) 689-2090 (sysop is Jon Martin).

There are also two bulletin boards that are tree-structured and set up to facilitate teleconferencing. Since you haven't indicated this as a primary interest, we'll simply list the names and numbers of these bulletin boards in case you wish to explore this alternative.

Expert Systems, sysop Dave Bonn (206) 883-4403
PC Midnight, sysop James Shields (206) 367-7949

Q: I don't believe I've ever seen a listing showing where to *peek* at various memory locations to find out what's stored there. Have you done an article on this?

I still use DOS 1.0 and would like to tell my monitor what background and foreground colors to display without going to Basic. This way I could work on a program in color rather than black and white. Is there a way to do this?

Dugald Johnston

A: We did run a series of articles by Gary B. Little on how Basic stores numbers, variables, and programs. They're in the June ("Basic Number Storage"), July ("How Basic Stores Variables"), and August ("How Basic Stores Programs") 1983 *Softalks*, and I think you'll find them informative.

If you were using DOS 2.0, you could use Ansi.sys to set colors from DOS. With 1.0, you'll need a program to do this. An assembly language program published in the November 1983 issue of *Byte*, called *Screen*, allows you to use a combination of the alt key and the function keys to step through background and foreground colors. Take a look at it and see if it provides what you're looking for.

Q: I have a problem when printing from a Basic program to my Epson MX-80 printer. Each time I give a Basic character-string command to enable or disable underlined or emphasized print, all tabs following this command increment or decrement by 1 until a carriage return. For example, after a character-string command, *tab(20)* actually prints at *tab(19)*. If two character-string commands occur before *tab(20)*, the printer prints at *tab(18)* instead of *tab(20)*. A carriage return seems to reset the tabs and everything returns to normal until the next character-string command.

Is this problem caused by IBM Basic or my printer? Are there programming techniques to avoid this? Would the same thing happen with an IBM printer?

Donald Botting

A: The problem does not lie with your printer. Basic, when it tabs, counts everything—control characters and printable characters. So when you figure how far you want to tab, you too must count the control characters. For example, if you had the control characters *chr$(14)* and *chr$(26)* and wanted to tab twenty spaces, you would actually have to write *tab(22)* to take the control characters into account and have twenty spaces printed.

Q: I have an IBM PC with two parallel printers. One is a Diablo 630 letter-quality printer, the other a Gemini 15X dot-matrix printer. Currently I use one or the other by unplugging one and plugging in the other at the back of the PC. Both printers are LPT1 to DOS 2.0.

I will soon have an AST SixPac board, which includes an additional parallel printer port. The second port will be LPT2 to DOS 2.0.

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Lindsy Van Gelder, PC Magazine

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It seems as though I should be able to connect one printer to LPT1 and the other to LPT2 and issue a DOS command to tell it which port to use. However, there doesn't seem to be such a command in DOS. And none of the PC users or vendors that I've asked know how to do this.

I'm sure there must be a reasonably simple way. Can you help?

Hayne Baucom

A: You're right—there isn't a DOS command to do this, but there's a program, called *Printsw*, in "Questions and Answers," *Softalk*, April 1983. Each time you want to change from one printer to the other, just run this program, and it will switch you from LPT1 to LPT2 or from LPT2 back to LPT1.

Q: I have discovered a small bug in John Socha's Scrnsave.com program (December 1983): It conflicts with the cursor parameter of the BASIC *locate* statement, at least with the color/graphics adapter. If you use *locate* to turn off the cursor, it should stay off until you turn it back on with another *locate* statement. With Scrnsave.com loaded, this isn't the case. When BASIC executes a *cls*, you get a cursor back. It won't necessarily be the cursor you set, but there will be a cursor of two scan lines blinking in your display. As a matter of fact, this cursor bears a striking resemblance to the DOS cursor.

I like the capability Scrnsave.com affords, but having a blinking cursor in the middle of a menu is a little annoying. One way to solve this problem is to ensure that each time you program a *cls* you turn off the cursor again with a *locate* statement. There has to be a better solution. Can you offer any way to fix this?

Charles Campbell

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Q: Is there a command that can be issued in an Autoexec.bat file to have the time and date automatically sent to the printer without form feeds?

Kay C. Karchevski

A: There is. Include these lines in your Autoexec.bat file.

```
DATE
DATE > PRN
TIME
TIME > PRN
```

The first time you see the date prompt, respond with the current date. The next time you see the prompt, "Enter new date:" (caused by the line *date > prn*), respond with a carriage return, and the date you entered above will be sent to the printer. If you omitted the date line and only included the *date > prn*, what would be sent to the printer is:

Current date is Tue 1-01-19801-24-84

If you include both lines, the line "Current date is Tue 1-24-1984" is printed. Do the same thing with the *time* command.

Q: I use *SuperCalc2*, and it's great, except that it doesn't have an internal rate of return command—a very important tool for financial analysis. Building an iteration table for each spreadsheet model that requires this function is a big hassle. *NPV* is okay but only does a fraction of the job. Could you suggest a way to plug *SC2* with a routine to handle this need?

William E. Hewitt

A: Sorcim says that rather than give you a routine, they would like you to upgrade to *SuperCalc3*, which does have an internal rate of return command. They're offering *SC3* to current licensed users at a discounted price of $125. To order it, call their access department at (408) 942-0771.

Q: I have two questions about graphics on the XT. First, is there any way I can modify the background and foreground colors of the text on the IBM color monitor so that when I invoke a *cls* command from DOS the display will not clear to the conventional white on black?

Second, I understand there are only two palettes for color graphics. Is there any way I can change the three basic colors in each of the palettes without changing the hardware?

Victor Romano

A: An answer to your second question first: No, there is no way to change the colors in each of the palettes in software. Sorry. Maybe with the new (rumored) IBM color board this will be an option.

Use the extended screen control and keyboard functions described in Chapter 13 of the DOS 2.0 manual to select foreground and background colors. If you set the foreground and background colors of your display this way, even the *cls* command won't change the screen. Otherwise, the screen has white characters on a black background.

Here are the steps involved.

First, create a file containing an escape character. Because both DOS and Edlin interpret the escape character as a line-cancel command, the most practical way to get an escape character into a file is with either Debug or BASIC. The file must actually contain four bytes: escape (1BH), carriage return (0DH), line feed (0AH), and end-of-file (1AH).

Here's how to create such a file using Debug (the underscored part of this dialog is what you type; the Xs in lines 4 and 5 represent any hexadecimal digit):

```
A>Debug esc
File not found
-e 100
XXXX:0100 XX.1B (space) XX.0D (space)
```

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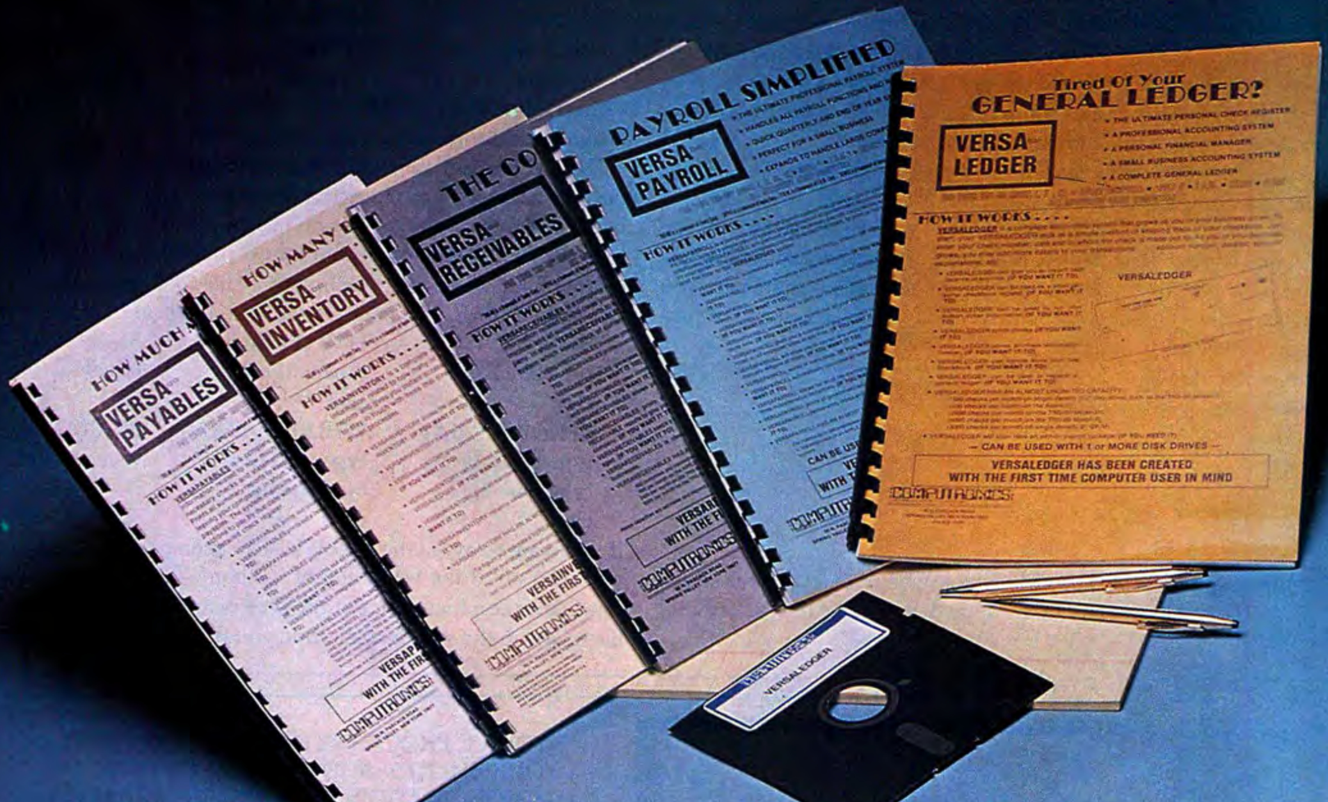

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```
XX.0A (space) XX.1A (carriage return)
-r cx
CX 0000
:4
-w
Writing 0004 bytes
-q
A>
```

You need to do this only once; you can copy the file as many times as you need it and use Edlin or any other editor that makes ASCII files to complete the strings of control characters to set the colors.

Second, create a file or files containing the strings of control characters to set the foreground and background colors.

You can use the Edlin *transfer* command to copy the file Esc into another file. Edlin displays the escape character as ∧[.

The following commands create a file named Blue.bg that sets the background color to blue. Notice that there are *two* left brackets in line 1: The first is part of the representation of the escape character; you must include the second because the second byte of each string of control characters is a left bracket.

```
A>edlin blue.bg
New file
*tesc
*1
1:*∧[[44m
*e
A>
```

After you have set the color this way, the *cls* command clears the screen and moves the system prompt to the upper left, leaving the background color blue.

Batch files make it easier for you to set or change colors. Once you've created a file with a control string in it, you can easily create other files to set different colors by copying the existing file and changing the numbers.

Listed below are six files that contain control strings for three foreground and two background colors, plus one that resets the display to normal (white foreground, black background):

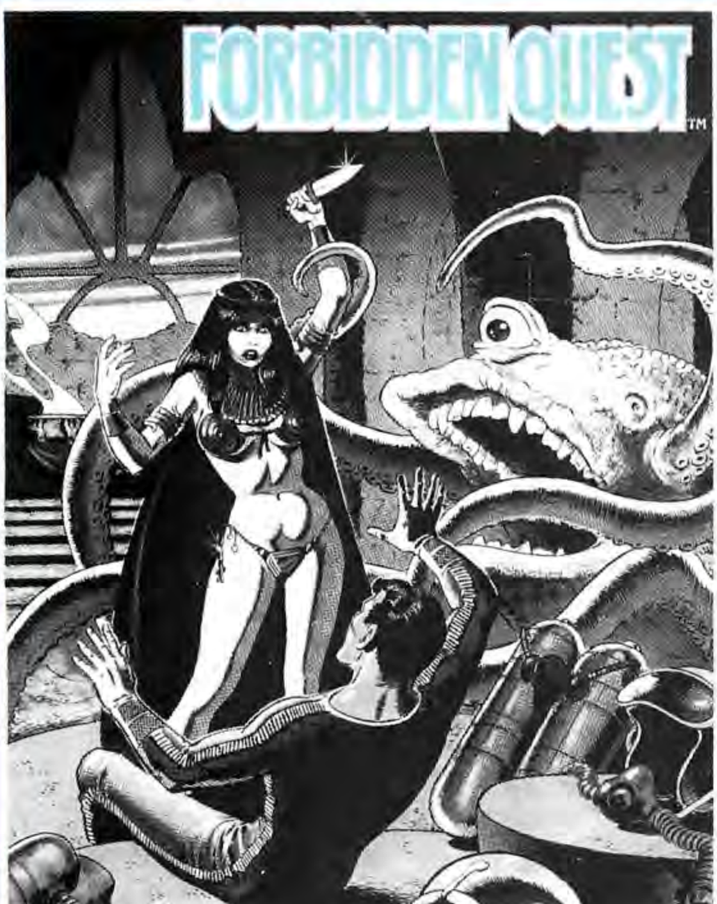
BLACK.FG	YELLOW.FG	WHITE.FG
∧[[30m	∧[[33m	∧[[37m
BLUE.BG	RED.BG	NORMAL
∧[[40m	∧[[41m	∧[[0m

You'll find the complete table of control characters for each background and foreground color on page 13-8 of the DOS manual.

By creating separate batch files for each color, you give yourself the flexibility to write batch files that set any combination. Here are several batch files that set the colors and use the *cls* command to fill the screen with the background color; omit the *cls* command if you don't want to clear and fill the screen. The first three files change only one color; the last three change both background and foreground colors:

BLACKF.BAT	WHITEF.BAT	BLUEB.BAT
type black.fg	type white.fg	type blue.bg
cls	cls	cls
BLK&BLUE.BAT	WHI&RED.BAT	NORMAL.BAT
type black.fg	type white.fg	type normal
type blue.bg	type red.bg	cls
cls	cls	

If you want to avoid the double system prompt after the *cls* command, add *echo off* at the beginning of the batch file. If you always use the same color combination, put the *type* command in your Autoexec.bat file to set up the system each time you turn it on. ▲



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THE HYPERION: FULLY PORTABLE, PARTLY COMPATIBLE

BY JOHN SOCHA

Should you buy a Hyperion? Maybe. The question's not a simple one. The Hyperion has some attractive qualities, not the least of which is its tidy, aesthetically pleasing appearance. It also has problems.

First, let's look at the Hyperion's basic features.

Cost. A fully loaded Hyperion comes with two disk drives, 256K, one serial port, one parallel printer port, a clock/calendar, and an internal modem/phone system. The package includes MS-DOS (with GWBASIC), Microsoft's *Macro Assembler*, and Hyperion's own relational database program. List price for this assemblage (including a one-year warranty): $3,690. The same hardware and software, sans second disk drive, lists at $3,195.

Considering that IBM's own portable machine, with two drives, 256K, and a printer port, retails for $3,370, the price of the Hyperion seems a little steep.

Portability. A two-disk-drive Hyperion weighs in at twenty-one pounds, which is a good deal lighter than most of the alternatives; the Compaq, the portable Corona, and IBM's own portable all weigh something over thirty pounds. So while most PC-compatible portables are merely transportable, the Hyperion really is light enough to carry around (the single-disk-drive model weighs a mere eighteen pounds). The top of the machine is sculpted in such a way as to make for easy pickup and carry, the keyboard tucks in neatly under the display and disk drives, and the package as a whole is small enough to fit almost anywhere; it slides under an airplane seat, for example, with no trouble whatsoever.

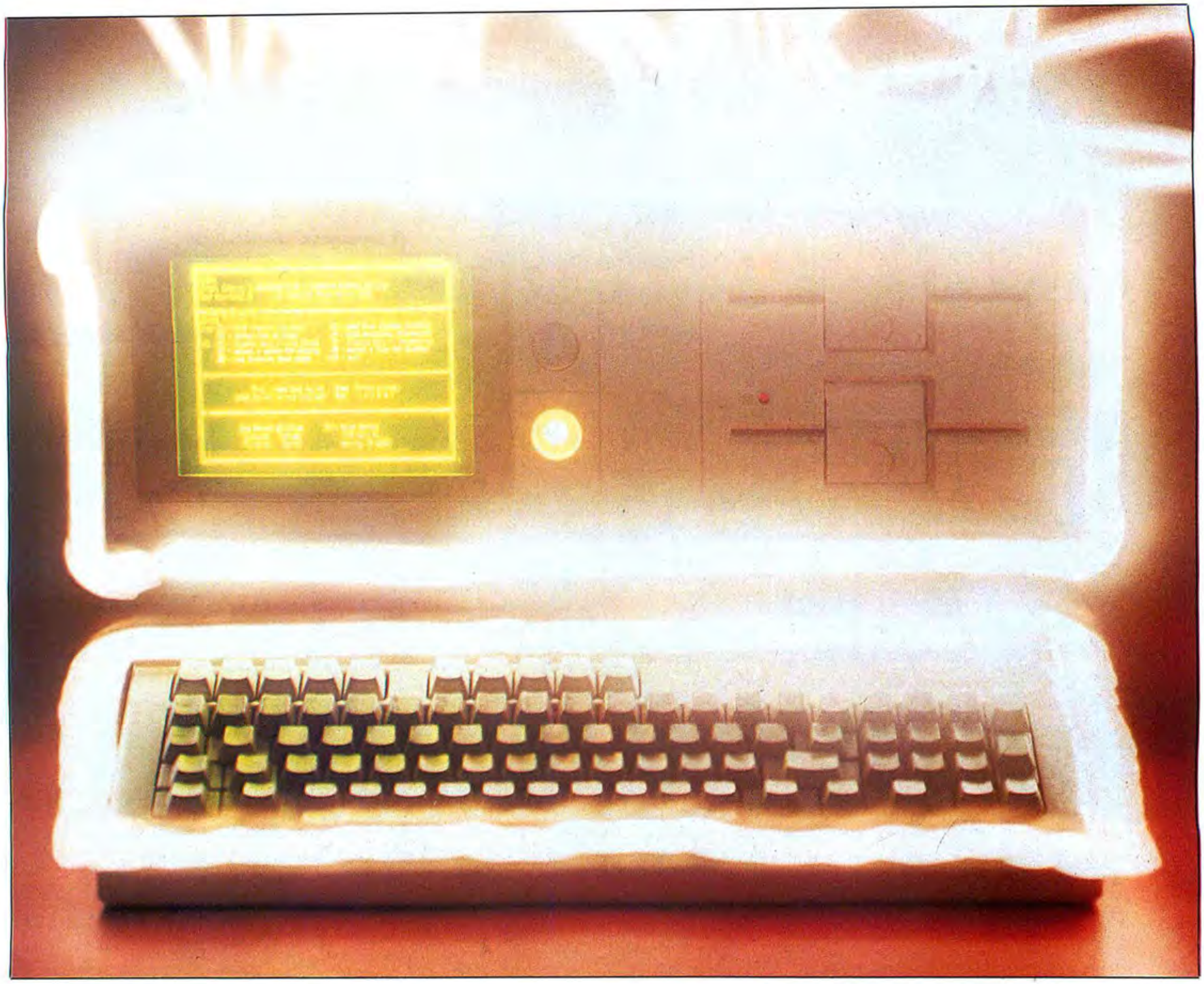
But to achieve this lightness, compromises had to be made in certain areas. In expandability, for example.

Expandability. The Hyperion has no (zip, zero) expansion slots. For an additional $1,290, you can buy an expansion box (it connects to the back of the Hyperion) that will let you add cards and/or a hard disk ($2,995 gets you the expansion unit with ten-megabyte Winchester installed).

Disk Drives. The Hyperion's disk drives read and write standard PC-DOS 1.0 and 1.1 disks—but not nine-sector PC-DOS 2.0 disks. Hyperion's version of MS-DOS is much the same as PC-DOS 1.1, but it incorporates a few changes designed specifically for the Hyperion; as a result of these changes, it runs only on a Hyperion. Because this operating system is of the same vintage as PC-DOS 1.1, it can't read nine-sector (360K) disks. But since

The Hyperion's nine-inch amber display (far left) features the usual contrast and intensity controls. When the computer is packed away in its carrying bag (left), the keyboard (right) disappears under the system unit.


Hyperion



the Hyperion is a PC-compatible computer, it can run IBM DOS 2.0 (on eight-sector disks).

With IBM DOS 2.0 running, the Hyperion still doesn't read nine-sector disks. Why not? It seems the disk drives on the Hyperion are slightly different from the Tandon or Control Data drives installed on IBM PCs. Hyperion promises that its version of MS-DOS 2.0, to be released soon, will be able to read and write PC-DOS 2.0 disks.

The same factors that prevent the Hyperion from reading nine-sector disks also keep it from running certain copy-protected programs—particularly games. If you aren't especially interested in games, this may not be of concern to you. But be forewarned: There may be other copy-protected programs that don't run.

Display. At seven inches (diagonal), the Hyperion's built-in amber display is roughly half the size of the IBM monochrome display and significantly smaller than the nine-inch screens built into various other portables. The compactness of this display is both useful and annoying. What's useful about it is that it contributes to the lightness and carryability of the machine. What's annoying is that the display is too small for prolonged use.

Nevertheless, text is easier to read on the Hyperion screen than on most screens driven by the IBM color/graphics adapter. Bytec-Comterm obviously put some thought into the design of this display.

On IBM's color/graphics adapter, characters from one line can touch the tops of characters in the line below. Not so on the Hyperion. Bytec-Comterm placed an extra scan line between lines of characters; they also used a slightly different design for their characters that makes them easier to read.

Next we come to the question of color. Hyperion's display mimics the IBM color/graphics adapter, so it would be reasonable to expect its text mode and graphics modes to have color. But since the built-in display shows only amber or black, the Hyperion converts all colors to shades of amber.

On the back of the Hyperion is a connector for an external monitor, and you might expect this to produce color signals. Unfortunately, it doesn't. Bytec-Comterm saved a few cents of circuitry by sending out shades of gray rather than colors, so don't expect any color with the Hyperion.

Other than these differences, the Hyperion's display closely mimics IBM's. The same can't be said of the Hyperion's keyboard.

The Keyboard. The keyboard layout is more like that of an IBM Selectric than a PC. The shift keys are full-sized, unlike the stunted shift keys found on the PC, so they don't cause transition problems for people used to a normal keyboard. The numeric keypad on the right includes a comma key beneath the plus and minus keys;

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The disk drive door springs open in response to a gentle push.

the comma is a godsend for programmers who need to enter a lot of numbers separated by commas.

But things become somewhat confused on the left side of the Hyperion's keyboard. The cluster of keys between the left shift and the escape key cause a few problems. In the place where you'd expect to find the control key you'll find caps lock. This means that if you're used to working on a PC with *WordStar* or some other program that employs a lot of control-character codes, you may experience a considerable amount of frustration as you try to adjust to the Hyperion. The control key, moreover, is far enough away from the alphanumeric keys that certain control codes you're used to doing one-handed on the PC may exceed your reach on the Hyperion.

The real killer, though, is not the layout of the keyboard but its hardware. The keyboard hardware on the Hyperion is slightly different from the hardware found in any PC. That shouldn't cause problems most of the time, but, because many software companies have taken to replacing the ROM BIOS routines for keyboard I/O, it sometimes does.

The ROM BIOS routines are a set of machine-language programs inside any IBM PC or PC-compatible that control much of the hardware. One subset of these routines is responsible for reading characters from the keyboard. And for almost all programs, these routines work. But since many software companies, for reasons unknown, reinvent these routines, an increasing number of programs choose to read characters directly from the hardware (instead of using the BIOS routines).

Any program that chooses to read characters directly from the keyboard will run aground on the Hyperion. Communications programs are notorious for trying to achieve extra speed by going around the BIOS keyboard routines; two examples are *Smartcom* (from Hayes) and *PC/Intercom* (from Mark of the Unicorn), both of which need all the speed they can get.

Software Included. The Hyperion comes with Hyperion DOS—which is MS-DOS 1.25 with a few extras added by Bytec-Comterm; some of the extras are nice, others are not.

Hyperion DOS puts a status line at the bottom of the screen that displays the current time and the status of the caps lock and num lock toggles. It's really nice to be told whether you're in caps or not and whether your number pad is set to make numbers—

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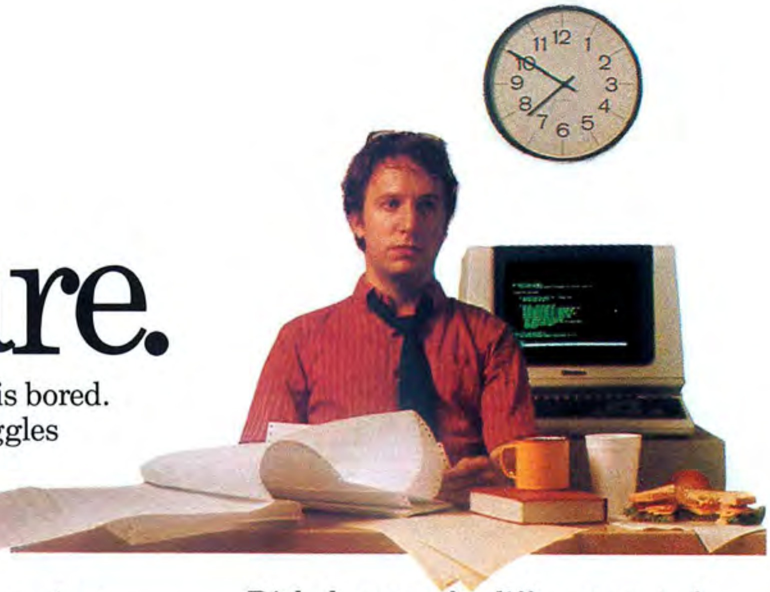

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The back of the Hyperion has connectors for power, an external video display, telephone, serial devices, and parallel devices.

especially when you're using a word processor or a spreadsheet program. And while watching the minutes tick by can be an irritating distraction if you're working against a deadline, the time display is for the most part a definite plus.

The status line also displays labels for the function keys. Since the function keys are laid out across the top of the Hyperion keyboard, these visual cues are more meaningful in this context than they would be on a PC. Furthermore, Hyperion DOS uses the function keys for a number of its commands, so if you forget the name of a command, you can usually find it on the screen. Bytec-Comterm seems to have put a great deal of effort into making the Hyperion accessible to the first-time user.

Hyperion DOS also includes "Help" and "Explain" programs. These employ a number of text files to explain many of the machine's features and programs. All you have to do is push F10 for *help* and you'll get a screenful of detailed descriptions of the commands shown on the function-key status line. The *explain* command pulls in a file from the disk with a more detailed description of any given command.

A very nice touch has also been added to the programs in the ROM BIOS. After about three minutes of inactivity, the Hyperion shuts down power to the disk drives and turns the screen off. This saves power and prevents damage to the screen.

The *type* command in Hyperion DOS is somewhat strange and irksome. *Type* works like its PC-DOS 1.1 and 2.0 counterparts, with one exception. When it reaches the end of a file it displays:

Done. Strike a key when ready . . .

Fair enough, but when you then press a key it erases the screen and places the DOS prompt at the top. This means you can't refer to the file you just typed as you enter the next DOS command. A few loose ends such as this aside, Hyperion DOS seems to be a nice upgrade of MS-DOS 1.1.

Conclusion. If you're shopping for your first computer, think carefully before you buy a Hyperion. Test the software you plan to use to be certain that the incompatibility problems mentioned won't affect you.

As a second machine, for use away from the office, the Hyperion could be the best buy around—mainly because of its size and weight. But again, before you buy, make sure the programs you plan to use will run. ▲

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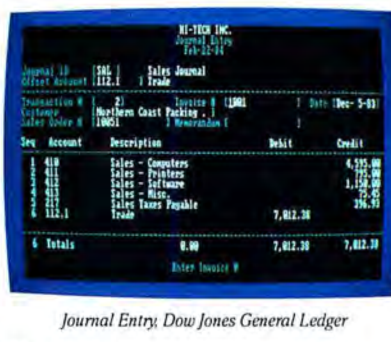

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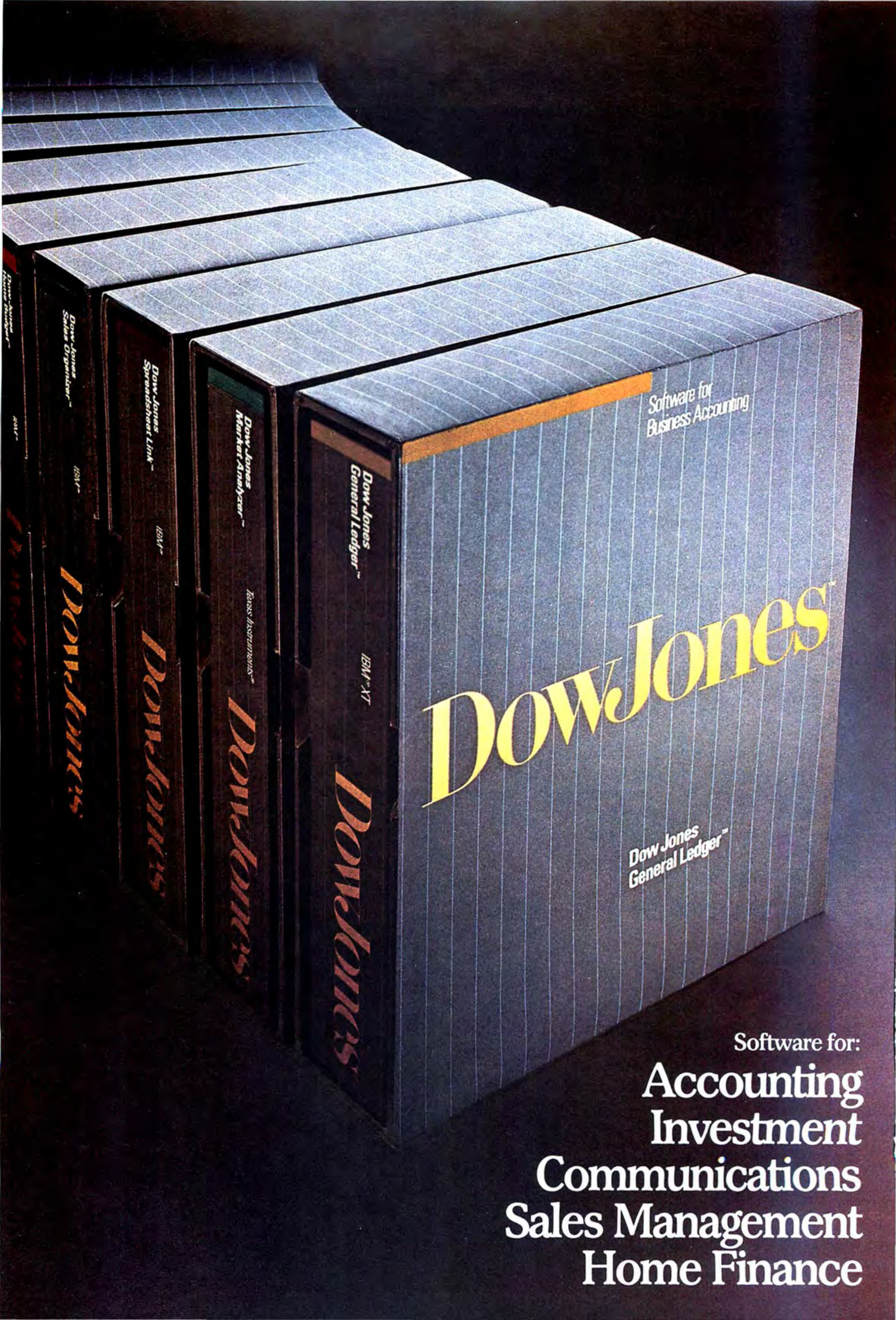

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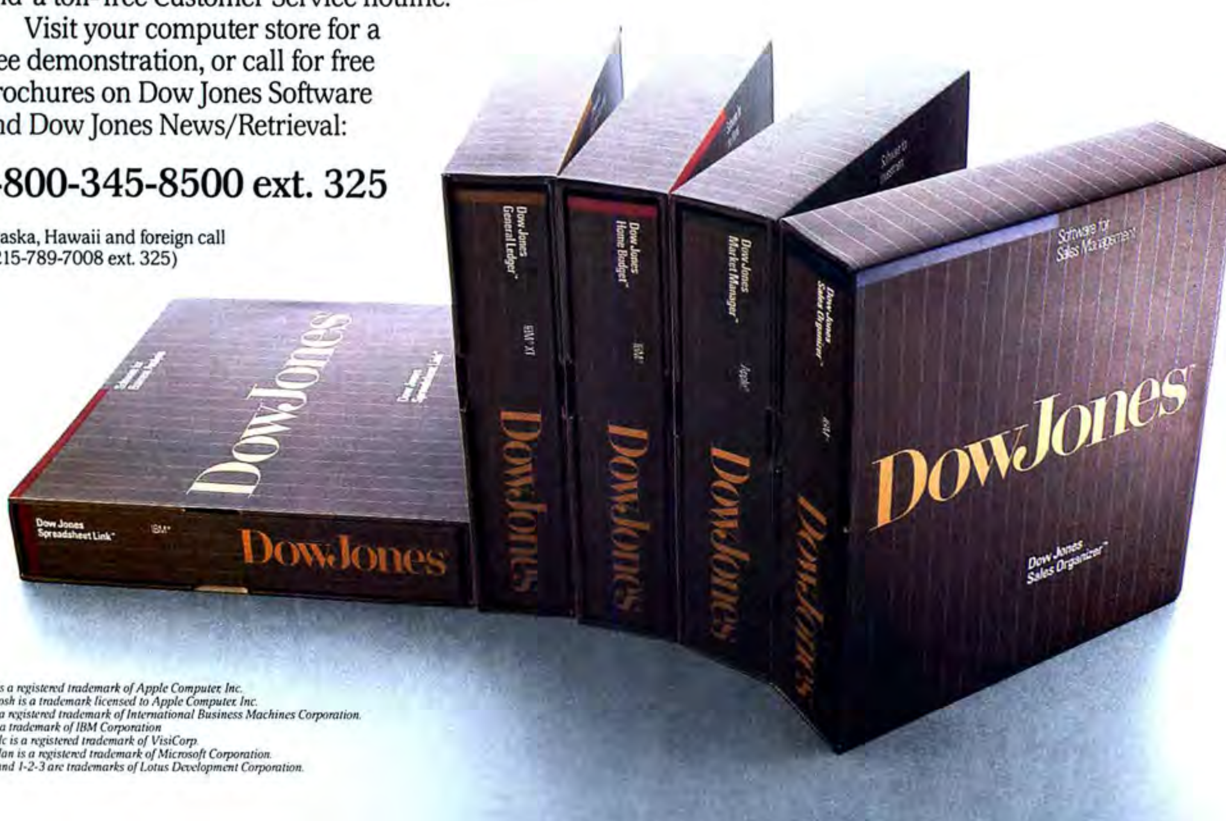

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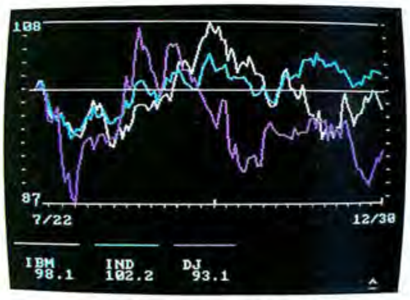

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BASICALLY SPEAKING

by John Dickinson

The BASIC Editor—and Other Subjects

Last time we learned how to create and save deferred-mode BASIC programs; deferred mode enables us to use the same program time and again without much difficulty. We also learned how BASIC's *for* loops enable us to repeat a set of calculations in a program, applying them to different data values each time. *For* loops are the most powerful and commonly used method of making BASIC programs perform repetitively.

You now have a few fundamental programming techniques at your command. There are others waiting to be learned, but before we get to them we're going to take a little time this month to explore some of the more useful details about BASIC's editor. Then we'll cover some new ways to get BASIC to think about numbers and other types of program variables.

Learning about BASIC's editor may seem like just another boring task, but knowing how it works will help you take advantage of BASIC's unique interactive programming environment. The new types of numbers you learn about will enable you to increase or decrease the level of precision in your programs and to make them more flexible, useful, and informative.

First, though, let's review where we are to be sure we haven't lost you. When we left off last month, our program to convert Celsius temperatures to the Fahrenheit scale was running correctly in BASIC's deferred mode, and we had then saved it on disk under the name Convertc.bas. The program looked like this:

```
10 FOR TEMP.CELSIUS = 10 TO 100 STEP 10
20 LET TEMP.FAHRENHEIT = 32 + TEMP.CELSIUS * 9 / 5
30 PRINT TEMP.FAHRENHEIT, TEMP.CELSIUS
40 NEXT TEMP.CELSIUS
```

Line numbers, you'll recall, are required in BASIC deferred-mode programs; they determine the primary order of program statement execution. The *for* statement in line 10 controls the *for* loop of the program. The loop converts Celsius temperatures between 10 and 100, in increments (*steps*) of 10, to the Fahrenheit scale. This pattern is determined by the *for* statement. The loop counter is Temp.Celsius, and our *for* statement says that Temp.Celsius is to start off at a value of 10 and be incremented repeatedly (*step*ped) by 10 until its value exceeds 100.

Actual conversion of each Celsius temperature to the Fahrenheit scale occurs in the *let* (assignment) statement on line 20. The program executes line 20 every time it goes through the *for* loop. The results of the calculations, along with the original Celsius temperatures, are displayed as a result of the *print* statement in line 30, which also is executed each time the program goes through the *for* loop. The *next* statement at line 40 closes the *for* loop by incrementing the variable Temp.Celsius.

As long as the value of Temp.Celsius does not exceed 100, the program loops back to line 20 and executes statements 20 and 30 again. If we run the program by typing *run* or pressing the F2 key, the *for* loop continues to be executed until the value of Temp.Celsius exceeds 100. (If you're just catching up, you might want to reenter this program and try to run it. To save it to disk, type *save"convertc"* or press the F4 key and then type *"convertc"*.)

Last month it was suggested that you modify your deferred-mode version of Convertc.bas, making it convert Fahrenheit temperatures to the Celsius scale, and then save the new version as Convertf.bas. If you made the changes by following the rules set out last month for converting algebraic formulas and BASIC statements, you probably had little or

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no trouble with the mathematics of the changes.

But you may have had trouble with some of BASIC's other rules, so let's review the changes that are required. We'll be looking at a few of the tricks you can use with BASIC's built-in program editor, and in the process you'll get acquainted with additional BASIC error messages.

To change Convertc.bas to Convertf.bas, we need to make changes to almost all the statements in the program. There are three ways to revise statements in a deferred-mode BASIC program. You can retype the entire statement, including the line number; use BASIC's *edit* command to put the statement into edit mode, and use the cursor and other editing keys to make changes; or use the cursor keys to edit the statement as it appears on the screen in response to a *list* command.

All three ways are useful, and it's difficult to say which you'll prefer. However, the cursor movement keys (the four arrow keys on the right side of the keyboard), along with the insert, delete, tab, backspace, and escape keys, work the same way no matter which of the three methods you're using, so we'll be looking at how most of these keys work while we use each of the editing methods to change Convertc.bas.

If you haven't done so, start BASIC and load the Convertc.bas program by typing:

load"convertc"

or use the F3 key if you prefer. Then list the program (use the F1 key) to be sure it looks like the listing printed in the fourth paragraph.

The most complicated job (see last month's installment of this column) is changing the mathematical formula contained in the *let* statement on line 20. You can take the following steps to make the changes (remember, we're using the edit methods arbitrarily, and what follows is meant to demonstrate one way, but not the only way, to modify the line):

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• Use the up-arrow key to move the cursor to line 20; position the cursor under the 2 in 20.

• Use the right-arrow key to move the cursor to the Letter *F* in TEMP.FAHRENHEIT (you can just hold the arrow key down until the cursor has moved far enough).

• Press the insert key once to put the BASIC line editor into insert mode (the cursor will change from an underscore character to a block character).

• With the BASIC editor in insert mode, type the word *celsius*; you'll notice the rest of the line moving to the right as you type. Remember, as BASIC stores your program in memory, it converts any lowercase letters you type to uppercase letters (there's an exception to this point, but we'll come to it later), so you don't have to worry about whether you're typing capitals or small letters. There's an advantage to using lowercase letters when you edit a program listing, however: Because the listing shows your program in capital letters, any words or letters you type over this listing in lowercase stand out; this contrast makes it easy for you to see what you've changed.

• Now press the delete key several times until the word *FAHRENHEIT* disappears; the portion of the line to the right of the cursor will move to the left as you delete characters. If you want, you can simply hold the delete key down to delete characters, taking advantage of the keyboard's typematic facility. But be careful; you may delete more characters than you mean to (if that happens, just use insert to put the characters back into your program line). Notice that when you press the delete key the cursor returns to its normal size. When you're in insert mode, BASIC stays there as long as you type "ordinary" characters (letters, numbers, and punctuation symbols); it returns to its normal mode as soon as you type anything else.

• Now press the right-arrow key repeatedly (or hold it down and let it repeat) until the cursor is positioned under the *3* in 32. If you'd like a faster method of moving the cursor, try holding down the control key (the key marked *Ctrl*) and pressing the right-arrow key; each time you press the right-arrow key while holding down the control key, the cursor will jump to the next group of characters (holding down the control key and hitting the left-arrow key does the same thing in the other direction).

• Now use the delete key to remove all characters between the *3* and the *9* (including the *3* but not including the *9*). In other words, press the delete key repeatedly until the cursor is positioned under the *9*. Then type a *5* right where the *9* is, thereby replacing the *9* with a *5*. Move the cursor a little farther to the right until it's positioned under the *5*; replace that *5* with a *9*.

• Move the cursor to the *T* in TEMP.CELSIUS and press the insert key to return to insert mode. Insert a *(* in front of the *T*.

• Use just the right-arrow key (without the control key) to move the cursor to the *C* in TEMP.CELSIUS and type *fahrenheit* right over (and beyond) where CELSIUS was.

• Complete the new statement by typing *–32*.

We've made several changes to line 20, but BASIC won't remember what they are unless we tell it to by pressing the enter key. If you don't press enter, nothing will happen and BASIC will continue to use your original version of line 20.

This might seem like a lot of work just to make a few changes in a BASIC statement, but the objective here was to demonstrate several things about BASIC's editor all at once. With a little practice, you won't find the BASIC editor any more difficult to use than other editors you may be accustomed to.

To make sure that you've changed line 20 correctly, move the cursor to the bottom of your program listing (use the down-arrow key) and type:

```
list 20
20 LET TEMP.CELSIUS = 5 / 9 * (TEMP.FAHRENHEIT - 32
Ok
```

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We could have just listed the entire program, but it's worth knowing that you can specify one or more line numbers in BASIC's *list* command. Here are all the ways you can ask BASIC to list some or all of your program:

COMMAND	EFFECT
list	lists entire program
list 20	lists line 20 only
list 20—30	lists line 20 through line 30
list -30	lists program from beginning to line 30
list 30-	lists program from line 30 to the end

You can use the F1 key when you're specifying line numbers to be listed.

Were the modifications we made to line 20 sufficient to change our program to convert Fahrenheit temperatures to Celsius? Let's run it and see. Use the F2 key or type *run* into BASIC's screen. You should see:

```
Syntax error in 20
Ok
20 LET TEMP.CELSIUS = 5 / 9 * (TEMP.FAHRENHEIT - 32
```

on your screen.

What happened? Why is line 20 displayed on the screen? Why is the cursor positioned under the *2*? Earlier, when you were working in BASIC's immediate mode, you learned that BASIC issues a "Syntax error" message whenever it doesn't understand your instructions. BASIC does the same thing in deferred mode, so something in this version of our program isn't comprehensible to BASIC.

In a deferred-mode program, BASIC knows which line number contains the syntax error, and it not only gives you that information (in this case telling you that your problem is in line 20), but it also presents the offending line on the screen and puts your cursor under the first character in the line, thereby making it easy for you to fix the problem right away. The only thing BASIC doesn't do is tell you exactly what the nature of the error is (or correct it for you).

All we have to do now is determine what our mistake is and correct it in edit mode (we don't have to use edit mode, but since BASIC was good enough to put us there, we might as well).

In this case, our problem is that we forgot to close the pair of parentheses in the *let* statement. Just like English, BASIC requires a right parenthesis for every left one you use. To remove the error, do the following:

- Press the end key (on the PC keyboard, that's the 1 key on the numeric keypad; if you're working at a Junior, hold down the Fn key and press the down-arrow key) to move the cursor to the end of line 20.
- Type *)* to add the right-hand parenthesis character.
- Press the enter key to make your change take effect.

That's it. The problem's fixed, and you're ready to rerun your program.

Uh-oh. That's quite a mess! If you've run the program, you should be seeing

```
0      -17.77778
0      -17.77778
0      -17.77778
```

displayed over and over again. As things stand now, in fact, BASIC will go on displaying these two numbers forever—or until you do something to stop it.

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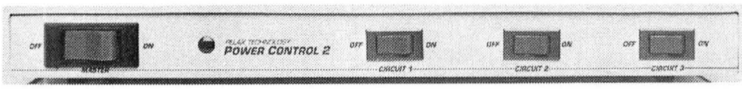

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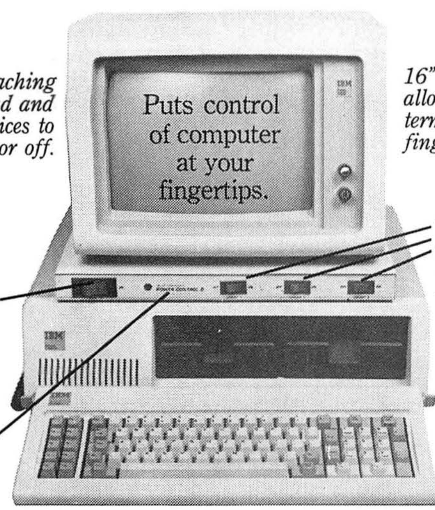

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it's also marked *scroll lock*). If you're at a Junior, hold down the Fn key and press the break key. You should then see the message:

Break in XX

displayed on your screen, followed by BASIC's friendly (and welcome) Ok message. This procedure—pressing control-break—is how you stop a BASIC program when things are going wrong (as they were just now) or when you just want to stop things. The *XX* in the message tells you which statement number BASIC was attempting to execute when it noticed you had pressed control-break.

Now that we have the program stopped, what's wrong with it? Let's clean up the mess on the screen (use the *cls* command) and list the program. It should look like this:

```
10 FOR TEMP.CELSIUS = 10 TO 100 STEP 10
20 LET TEMP.CELSIUS = 5 / 9 * (TEMP.FAHRENHEIT - 32)
30 PRINT TEMP.FAHRENHEIT, TEMP.CELSIUS
40 NEXT TEMP.CELSIUS
```

The problem has to do with the way lines 10 and 20 work together. The way our program is currently written, the loop counter, Temp.Celsius, is assigned a constant value at each iteration of the *for* loop. This assignment (line 20) overrides the instructions contained in our *for* statement (line 10); the effect is that the value of Temp.Celsius never exceeds 100 (in fact, Temp.Celsius never gets anywhere near 100!). As a result of this mix-up, the *for* loop—and therefore our program—just keeps going.

How does BASIC come up with the numbers 0 and −17.77778? Remember that when BASIC starts running a program it first issues a *clear* command to set the value of all variables to 0. That means that the first time our *for* loop is executed Temp.Fahrenheit has a value of 0 (Temp.Celsius has a value of 10 assigned to it in the *for* statement). A quick calculation (use BASIC's immediate mode to check this, if you want) will tell you that if Temp.Fahrenheit is 0, the effect of the assignment statement in line 20 will be to give Temp.Celsius the value −17.77778. Line 30 then results in the display of 0 and −17.77778 on your screen.

When the *next* statement is executed on line 40, 10 is added to Temp .Celsius, as specified in the *step* option of the *for* statement. Temp.Celsius then has a value of −7.77778. However, Temp.Fahrenheit still has a value of 0 because nothing in the program has changed it. So, when the program returns to line 20 on its next pass through the *for* loop, Temp.Celsius is again assigned the value −17.77778.

Each time through the *for* loop, this entire sequence of events is repeated—again, again, and again. We have created what is known in all programming languages as an *infinite loop*. Notice that BASIC doesn't treat the infinite loop as an error; there are situations where an infinite loop is desirable—where a program requires an infinite loop in order to run correctly (not many such situations, but we'll include some examples later on in this series). Nevertheless, for our current program, an infinite loop is not quite what we had in mind. We need to do something about it.

Infinite loops are easy to recognize but not always easy to fix. In the present case, the cause of the problem is not that the loop counter is being reset by the program (that's the symptom, rather than the cause), but that the program's *for* loop is being controlled by the wrong loop counter.

Our original program required that we convert Celsius temperatures to the Fahrenheit scale, so we used Temp.Celsius as a loop counter and had the program recalculate the value of Temp.Fahrenheit each time the value of Temp.Celsius was changed by an iteration of the *for* loop. Our new program, however, requires that we convert Fahrenheit temperatures to Celsius, and we've edited the assignment statement in line 20 to reflect this change in objective. We need also to modify our

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program so that it uses Temp.Fahrenheit, instead of Temp.Celsius, as the loop counter.

Once we've identified the problem, it's easy to fix. Use the up-arrow key to move the cursor to line 10 in the program listing you just displayed on your screen, and use the right-arrow, insert, and delete keys to replace CELSIUS with FAHRENHEIT, just as you did earlier when you were editing line 20. Now when you run the program, you will see:

```
NEXT without FOR in 40
```

displayed on your screen (we promise this is the last error message for a little while). BASIC is objecting this time because we told it to use the wrong variable in the *next* statement in line 40; the variable we specify in a *next* statement must match the variable in the companion *for* statement.

To fix this problem, just enter:

```
40 NEXT TEMP.FAHRENHEIT
```

into BASIC's screen right where your cursor is positioned—or edit the existing line 40 if you prefer.

Now, run the program again. This time you'll see:

```
10    -12.22222
20    -6.666667
30    -1.111111
40    4.444445
50    10
60    15.55556
70    21.11111
80    26.66667
90    32.22223
100   37.77778
```

These are (at last) the correct results. A good habit to get into is to check your program's output using BASIC's immediate mode or a hand calculator.

You'll probably want to save your converted program under a different name. So type:

```
save"convertf"
```

or use the F4 key to save it as Convertf.bas on your disk or tape (from here on we won't always remind you to save programs).

Something you might notice about this program's output is the level of detail in the information supplied. Each value for the Celsius temperatures is shown with five digits to the right of the decimal point (and up to two to the left). This is because, unless you tell it to do otherwise, BASIC performs its calculations using "real" numbers (numbers that have seven digits of precision). To state this another way, real numbers are BASIC's default data type.

What does that mean? In computer terminology, a real number is one that has a decimal fractional component; an integer, by contrast, is a whole number—a number without a fractional component.

For many applications in which our temperature-conversion program might be used, the output of real-number data is likely to give you more detailed information than you need. For example, it's difficult to discern fractions of a degree on a typical household thermometer. If we were doing the calculations by hand, we might just round off the numbers to get rid of the extra information. Can we round off the numbers in BASIC? Sure. When it comes to numbers, BASIC can be as flexible as we need it to be.

In both the Convertc.bas and Convertf.bas programs, BASIC used real numbers (because we didn't tell it to do otherwise) and therefore displayed the fractional components of the temperatures it calculated. To get rid of the extra information in the fractions, all we have to do is change our program (we'll work with Convertf.bas here) so that BASIC works with integer values instead of real ones.

How do we do that?

You can tell BASIC what type of variable data you want to use by following some additional rules for naming variables. BASIC provides for suffixes to variable names that govern the type of data a variable is to hold. All we have to do to tell BASIC that we want a variable to hold integer values rather than real ones is add a % (a percent sign) to the end of the variable's name; any variable whose name ends with the % suffix is defined as (declared to be) an integer variable.

In the case at hand, changing TEMP.FAHRENHEIT to TEMP.FAHRENHEIT% and TEMP.CELSIUS to TEMP.CELSIUS% will do the trick. We have to be careful, however, to make these changes wherever these variables occur in our program. The BASIC editor has no global search-and-replace facility of the sort found in most word processors, so you have to do all the searching and replacing yourself.

Changing Convertf.bas is simple, because it's only four lines long. Changing a larger program is more difficult, so it's advisable to plan carefully (and experiment) when you're developing a larger BASIC program.

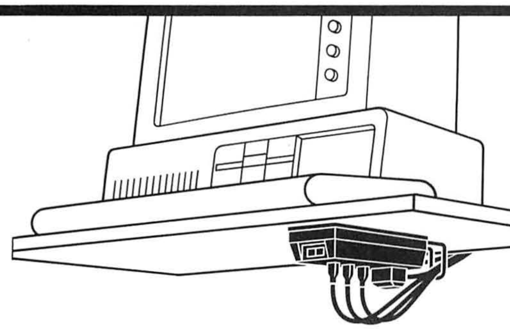
Use the BASIC editing facilities to make Convertc.bas look like this:

```
10 FOR TEMP.FAHRENHEIT% = 10 TO 100 STEP 10
20 LET TEMP.CELSIUS% = 5 / 9 * (TEMP.FAHRENHEIT%
   - 32)
30 PRINT TEMP.FAHRENHEIT%, TEMP.CELSIUS%
40 NEXT TEMP.FAHRENHEIT%
```

Notice that all occurrences of TEMP.FAHRENHEIT and TEMP.CELSIUS have been changed to TEMP.FAHRENHEIT% and TEMP.CELSIUS%. BASIC will now use integer arithmetic for these variables.

Run the program again and notice that the results are all expressed in nice round (integer) numbers:

```
10    -12
20    -7
```



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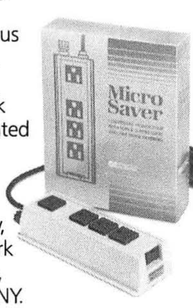

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```
30    -1
40    4
50    10
60    16
70    21
80    27
90    32
100   38
```

While many of us may require fewer decimal places in the program output, others may find that the original program was not accurate enough. An engineering or physics laboratory application, for example, may require a more exact number for the temperature. Not surprisingly, BASIC can handle this problem as well; in addition to the real-number variable type we've just seen, it has a second real-number type that uses extra digits for enhanced precision.

The real numbers that BASIC uses as a default data type are called *single-precision* real numbers. Real numbers of the other type are called *double-precision* real numbers.

How do we make a variable use double-precision numbers? Once again, appending a single character to the variable's name does the trick. In this case, the suffix to use is # (the pound, or number, sign).

If you change all the variable references in Convertf.bas so that the program uses only double-precision numbers, you will end up with this:

```
10 FOR TEMP.FAHRENHEIT# = 10 TO 100 STEP 10
20 LET TEMP.CELSIUS# = 9 / 5 * (TEMP.FAHRENHEIT#
   -32)
30 PRINT TEMP.FAHRENHEIT#, TEMP.CELSIUS#
40 NEXT TEMP.FAHRENHEIT#
```

If you run this version of Convertf.bas, however, you will get a

```
Type mismatch in 10
```

error message.

Why the error? BASIC has a restriction on the use of double-precision numbers; it doesn't allow you to use such numbers as counters in *for* loops. To make this program work, you have to change the data type of the loop counter. To take full advantage of double-precision calculations, you'll have to use a different variable for the loop counter—a variable other than the one used in line 20 to convert Fahrenheit temperatures to Celsius.

One way to implement the loop without giving up double precision is:

```
10 FOR LOOP.FAHRENHEIT% = 10 TO 100 STEP 10
15 LET TEMP.FAHRENHEIT# = LOOP.FAHRENHEIT%
20 LET TEMP.CELSIUS# = 5 / 9 * (TEMP.FAHRENHEIT#
   -32)
30 PRINT TEMP.FAHRENHEIT#, TEMP.CELSIUS#
40 NEXT LOOP.FAHRENHEIT%
```

Before you run this program, take a moment to study it carefully. Notice that in changing the loop-counter variable, we haven't changed the program's logic in any way; we've just used variables in a slightly different way.

Our newly defined integer variable, Loop.Fahrenheit%, controls the *for* loop, but the calculation of the temperature conversion uses Temp.Fahrenheit#, a double-precision variable. Line 15 assigns the value of Loop.Fahrenheit% to Temp.Fahrenheit# and takes advantage of BASIC's ability to convert numbers from one data type to another (some languages do not offer this ability). In this case, the conversion is very productive. BASIC executes *for* loops much faster if the loop counter is an integer variable; using integer variables for loop counters is a good habit to get into.

When you're satisfied that you understand what's going on, why not run the program to see the effect of using greater precision in the calculations.

One small point that's also worth noting is that we sneaked in a new line just by typing a line that used a number (15) that fell between two existing line numbers (10 and 20). There are no hard and fast rules for BASIC line numbering. You can number your program lines at consistent intervals or not, as you choose. The only rule is that BASIC will execute your program in ascending order of line number. BASIC's flexibility in this regard makes it easy for you to add lines to programs, should you discover that you've left something out.

If you want the line numbers in your double-precision temperature-conversion program to be at even intervals of 10 (as they were before you made the most recent change) you can renumber them by typing:

```
renum
```

into BASIC's screen. Try it, then list the program to see the results. (Even though *renum* is an abbreviation for the word *renumber*, don't type the whole word; BASIC won't understand what you mean.)

One last point should be made about the use of suffixes for defining variable data types. There is a BASIC suffix for single-precision real variables, just as there is for double-precision reals and integers; the suffix for single precision is *!* (the exclamation point). Even though we haven't used it before, we will be using the *!* suffix from now on. It might be a good idea for you to change your saved versions of Convertf.bas and Convertc.bas to include this suffix.

It's considered a good programming practice to include the *!* in your real variable names, because the inclusion of this suffix makes the type of variable more recognizable—and because you might get confused between variables and character data if you don't use it.

What's character data? It's the last data type we have to deal with in BASIC. Just as numbers can be used as data, so can characters.

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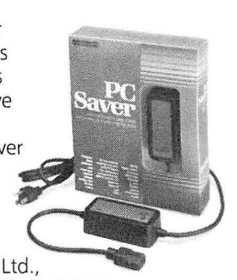

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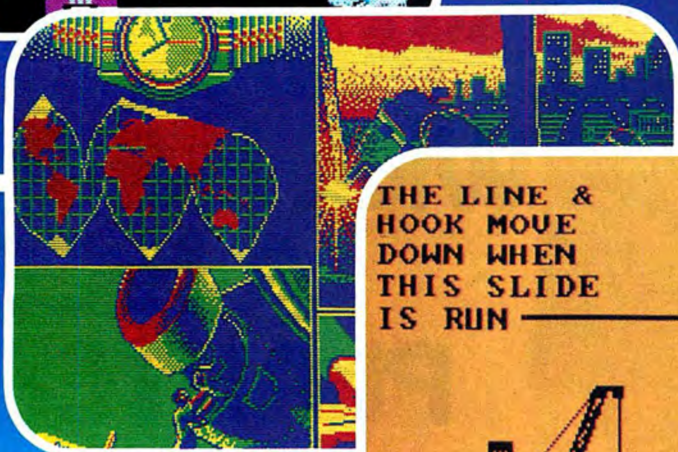

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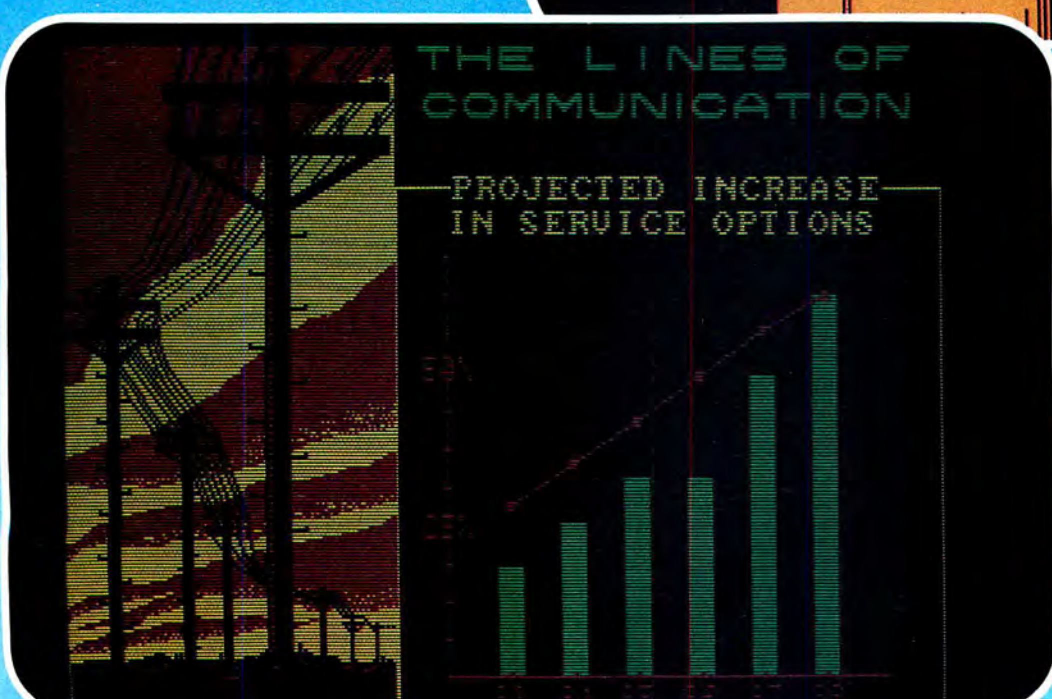

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Like numeric data, character data can be defined as constants or variables, and characters can be assigned to variables in assignment (*let*) statements. Character variables cannot, however, be used in arithmetic calculations, nor can they serve as loop counters. But most other attributes of variables (including some we haven't covered yet) apply to character, as well as numeric, data.

Because of its similarity to numeric data, character data is easy to learn to use. One rule to be aware of is that BASIC requires you to surround (delimit) character data by quote marks ("). The quote marks distinguish the data from whatever variable names and BASIC commands you might be using in your programs. When you use the *load* and *save* commands, BASIC treats your program's filename as character data; that's why you have to surround it with quote marks.

Let's use BASIC's immediate mode to give character data a try, and then we'll learn how to use it in our temperature-conversion programs. Type this into BASIC's screen:

```
? "Hello from BASIC!"
Hello from BASIC!
Ok
```

In this example, we're asking BASIC's immediate mode to tell us the value of the variable constant "Hello from BASIC!" (the exclamation point is included in the constant, but the quote marks are not). This may look a bit unfamiliar—maybe even awkward—to you, but it's really the same as asking BASIC to tell you what the value of a numeric constant is, as in:

```
? 99
99
Ok
```

We can also assign character data to character variables. We have to be careful doing so, however, as this example will demonstrate:

```
let x = "Hello from BASIC!"
Type mismatch
```

Why the "type mismatch" error? Remember, BASIC uses real data for variables if a suffix hasn't been assigned (yes, this is true even in immediate mode), and you can't assign character data to a numeric variable. BASIC is happy converting one numeric data type to another, but there are special rules and facilities for converting character data to numeric data. Until you learn them, just consider it a rule that you shouldn't try to do it.

You can, however, define a character variable by adding the appropriate suffix. The suffix for character variables is $, so a correct expression would be:

```
let x$ = "Hello from BASIC!"
```

After typing this in, we can ask BASIC to display x$'s value by typing:

```
? x$
Hello from BASIC!
```

Let's use character constants and character variables to improve the output of our temperature-conversion program (we'll also be using the *!* suffix now). We can add a line at the top of the program that prints a title as a character constant. Then we can assign data to some character variables and use them to make the rest of the output a little clearer. Try this on for size:

```
5 PRINT "Temperature Conversion - Fahrenheit to Centigrade"
6 LET CHAR.CELSIUS$ = "Celsius Temp ="
7 LET CHAR.FAHRENHEIT$ = "Fahrenheit Temp ="
10 FOR TEMP.FAHRENHEIT! = 10 TO 100 STEP 10
20 LET TEMP.CELSIUS! = 5 / 9 * (TEMP.FAHRENHEIT!
   -32)
30 PRINT CHAR.FAHRENHEIT$,TEMP.FAHRENHEIT!,
   CHAR.CELSIUS$,TEMP.CELSIUS!
40 NEXT TEMP.FAHRENHEIT!
```

Notice that any character that can be typed on the PC's keyboard can be used in character data. Because the data is enclosed between quote marks, it has no other meaning to BASIC; that means it's perfectly okay to use an equal sign, or any other character that BASIC would otherwise treat specially, inside quotation marks. BASIC doesn't even bother to translate lowercase letters to upper case when they're inside quotation marks. One exception: You cannot use a quote mark as character data inside of quote marks (there is a way to get around this limitation, as we'll see later on).

By now you know all there is to know about the different types of variable data that can be used in a BASIC program, and you've had a chance to give each a try. There are many more tricks to learn about character data and some more mathematics rules that apply to numeric data, but we'll save these topics for later. You've also gotten some practice using BASIC's built-in editor to modify programs as you develop them, and, while this editor is not the most flexible and powerful one available for the PC, it's unbeatable for developing programs in an interactive environment.

We've just about exhausted our temperature-conversion program (perhaps it's exhausted us). So next month we'll start something new while we learn about different ways to store variable data in memory and about saving information in a more realistic environment. ▲

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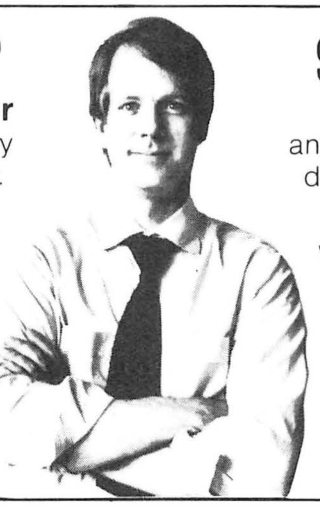

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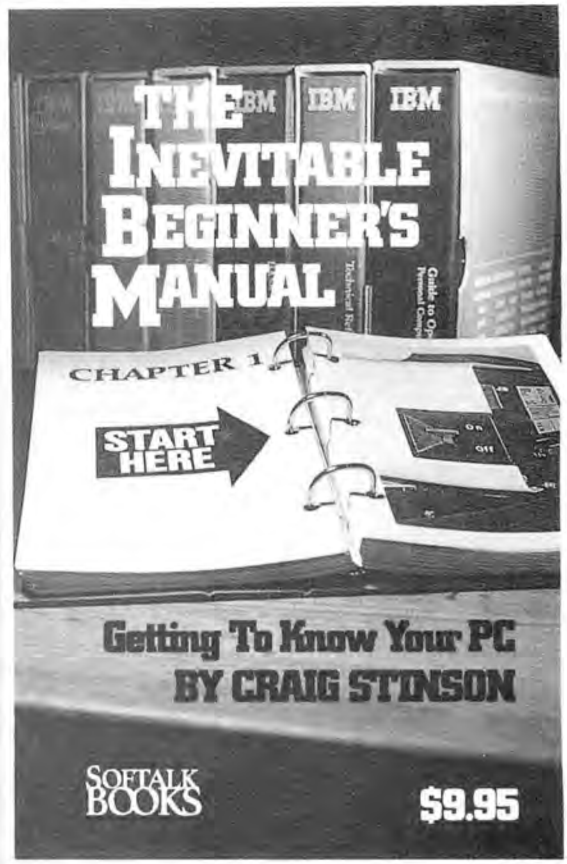

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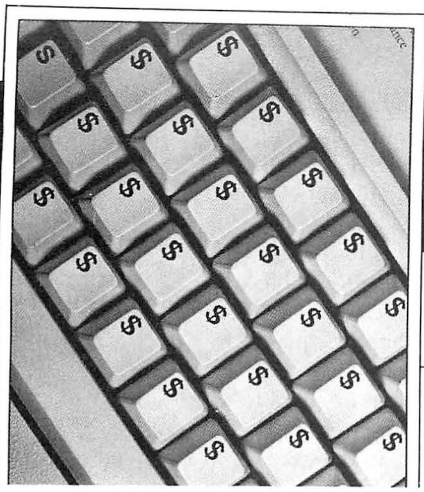


MICRO FINANCE

by Ken Landis

Linear Programming

During World War II, there was havoc not only on the battlefields but in the factories as well. The war's insatiable appetite for goods challenged some of the brightest mathematicians of modern times to develop quantitative systems for managing businesses. The beginnings of management science, the art of solving business problems with mathematics, took hold during the war.

Since then, the field has continued to evolve and mature to the point where no company of considerable size does not have a management science—or operations research—professional on staff.

Over the next several installments of this column, we are going to explore the field of management science/operations research.

The first tool we'll examine is linear programming (LP). Linear programming is a powerful, much-used technique for allocating limited resources toward the achievement of a goal. The theory behind LP is steeped in complex equations and proofs—about which we will not concern ourselves. We will focus instead on the substance applications of linear programming.

Our case study this month concerns a business we should all be fairly familiar with, the computer business. Tom Monk, the owner of an IBM PC peripheral manufacturing firm, wants to start a new production run of his two most popular products—a clock card and a memory card. His business has been growing rapidly— too rapidly, in fact. Sales have been so good that the majority of Tom's working capital is tied up in accounts receivable. Without borrowing more money, he is unable to expand his production by hiring more workers or buying more equipment. And he doesn't want to borrow more money right now.

The manufacturing resources Tom has at his disposal are 1,600 available labor hours over the next two days and 1,800 processing hours on the equipment needed to produce the cards. He has enough material to make as many clock cards as he wants, but he has only enough RAM chips to make 350 memory cards. Using these resources, Tom wants to maximize his profits by manufacturing the optimum mix of clock and memory cards. He'll use a linear programming model to determine the optimum product mix.

Before building the model, Tom needs to collect some additional information. He needs to know what resources are required to build each product and what the profit from each product will be.

He asks his shop foreman and finds out that it takes two hours of labor and six hours of processing time to complete one clock card. Memory cards take four hours of labor and two hours of processing time. As for profits, his accountant tells him that the profit per clock card is $3, while the profit per memory card is $8.

With this information in hand, Tom can begin to build the equations he needs to solve his problem. Since he still doesn't know how many of each kind of card he'll produce, he has to use algebraic variables to represent these quantities in his equations. He lets X_1 stand for the number of clock cards his factory will produce, and he lets X_2 represent the number of memory cards. The total profit to be generated by the manufacture of these cards is also unknown, so he assigns the variable P to that quantity.

Since the profit from manufacturing one clock card is $3, the total profit Tom can earn from clock cards can be expressed as $3X_1$. Similarly, the profit from a single memory board is $8, so the profit to be made from their manufacture is $8X_2$. The total profit from manufacturing both products is the sum of these two quantities. Thus

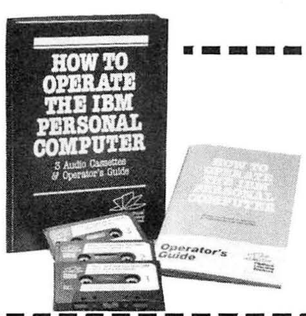
$$P = 3X_1 + 8X_2$$

This equation is known in linear programming as the objective function; maximizing P is the object of the entire analysis.

For example, if ten clock cards and twenty memory boards were produced, the objective function would be P = $3 * 10 + $8 * 20, which is the same as saying P = $190. But with this solution (which we just pulled out of the air as an example), two questions remain. Is $190 the maximum profit possible? And can Tom's factory produce that number and that mix of products within the constraints stated earlier?

The first phase in building a linear programming model that will answer these questions is the mathematical representation of the constraints.

The first constraint is the number of available labor hours—1,600 in Tom's case. Tom's foreman has told him it takes two labor hours to build a clock card and four to build a memory card. By the same reasoning we used earlier when we were designing the objective function, we now conclude that



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$2X_1 + 4X_2$ must be less than or equal to 1,600. In other words, two hours per clock card times the number of clock cards produced, plus four hours per memory card times the number of memory cards produced, must be less than or equal to the number of labor hours available—1,600.

If we go back to the objective function and assume that Tom's factory really did produce ten clock cards and twenty memory cards, and we put those values into our labor-constraint formula, we see that $2 * 10 + 20 * 4 = 100$, which is many fewer hours than the 1,600 available. If Tom were to produce only that many boards, he would be wasting 1,500 available hours.

What he wants to do is come as close as possible to 1,600 hours, while at the same time making as much money as he can. The objective function represents his profit-maximizing goal in the linear programming model, and the labor constraint exemplifies his limited, but available, labor resource.

The equation for the processing constraint is developed in the same manner as the equation for the labor constraint. One clock card takes six hours of processing time, while a memory card requires only two hours. The constraint therefore is that $6X_1 + 2X_2$ must be less than or equal to 1,800—the total processing time available. As processing time, or time available on the equipment, is probably a fixed cost, Tom does not have to maximize its usage, as he would with labor, which is a variable cost. Nevertheless, the 1,800-hour limit does represent a constraint; only 1,800 hours of processing time are available in Tom's factory, so this limit must be incorporated into the programming model.

The raw-material constraint follows the same logic as the labor and processing-time constraints. But the raw-material constraint affects only the memory cards. Tom has just enough RAM chips to make 350 memory cards, but he has enough material on hand (or can get it quickly) to make as many clock cards as he wants. So the raw-material constraint can be expressed as the requirement that X_2 be less than or equal to 350.

The only remaining constraint that needs to be built into the model is the "intelligence" that lets the model know that we cannot produce a negative number of products. Linear programming models, like computers, are dumb. If you don't tell them exactly what you want, you won't get what you want. Since negative numbers do exist in mathematics, we have to tell the model that they don't exist for the purpose of finding this solution. To do this, we simply tell the model that X_1 and X_2 must be equal to or greater than 0.

That's all the information Tom needs to build his model. Let's summarize:

X_1 equals the optimum number of clock cards to be produced.

X_2 equals the optimum number of memory cards to be produced.

The objective function is to maximize P in the equation $P = 3X_1 + 8X_2$, subject to the following constraints:

$2X_1 + 4X_2$ must be less than or equal to 1,600 (labor hours).

$6X_1 + 2X_2$ must be less than or equal to 1,800 (processing hours).

X_2 must be less than or equal to 350 (parts available for memory cards).

X_2 must be greater than or equal to 0 (no negative production).

X_2 must be greater than or equal to 0 (no negative production).

Notice how we have kept the variables lined up in columns, much as we would line up decimal places in an addition problem. This format makes the equation easier to read and to solve.

The objective of linear programming is to represent mathematically a real-world business goal in terms of a measurable objective—such as profit, cost, revenue, distance, and so on. The expression must be a linear function (an equation where two variables are multiplied by each other and added to other variables that are treated the same way), and the objective must be either to maximize some factor (profit or revenue, for example) or to minimize some factor (cost, distance, whatever).

Traditionally, a linear function would be represented as Z (the equivalent of P in our example) $= C_1$ (the "usage" variable 1) $* X_1$ (the controllable variable). Z is the measure of performance we wish to maximize or minimize (depending on the situation), while C_1 is the variable that expresses the resources required or generated by a particular item, and X_1 represents the number of these items we have decided to produce, create, or use.

The constraints we stated are a set of mathematical expressions representing the restrictions imposed on the controllable variables that thereby limit the possible values (solutions) of those variables. The constraints can be given as either linear equations (for example $X_1 + X_2 = 100$) or as linear inequations: $(X_1 + X_2 \leq 100)$. For any problem, there are four potential linear inequations; less than, greater than, less than or equal to, and greater than or equal to.

There's no limit to the number of variables or constraints that can be built into a model. However, the more a model has, the more complicated it is to solve.

Next month we'll use a software package to solve Tom's production problem. ▲

OUR AD #15

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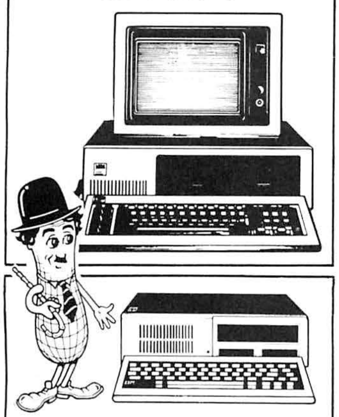

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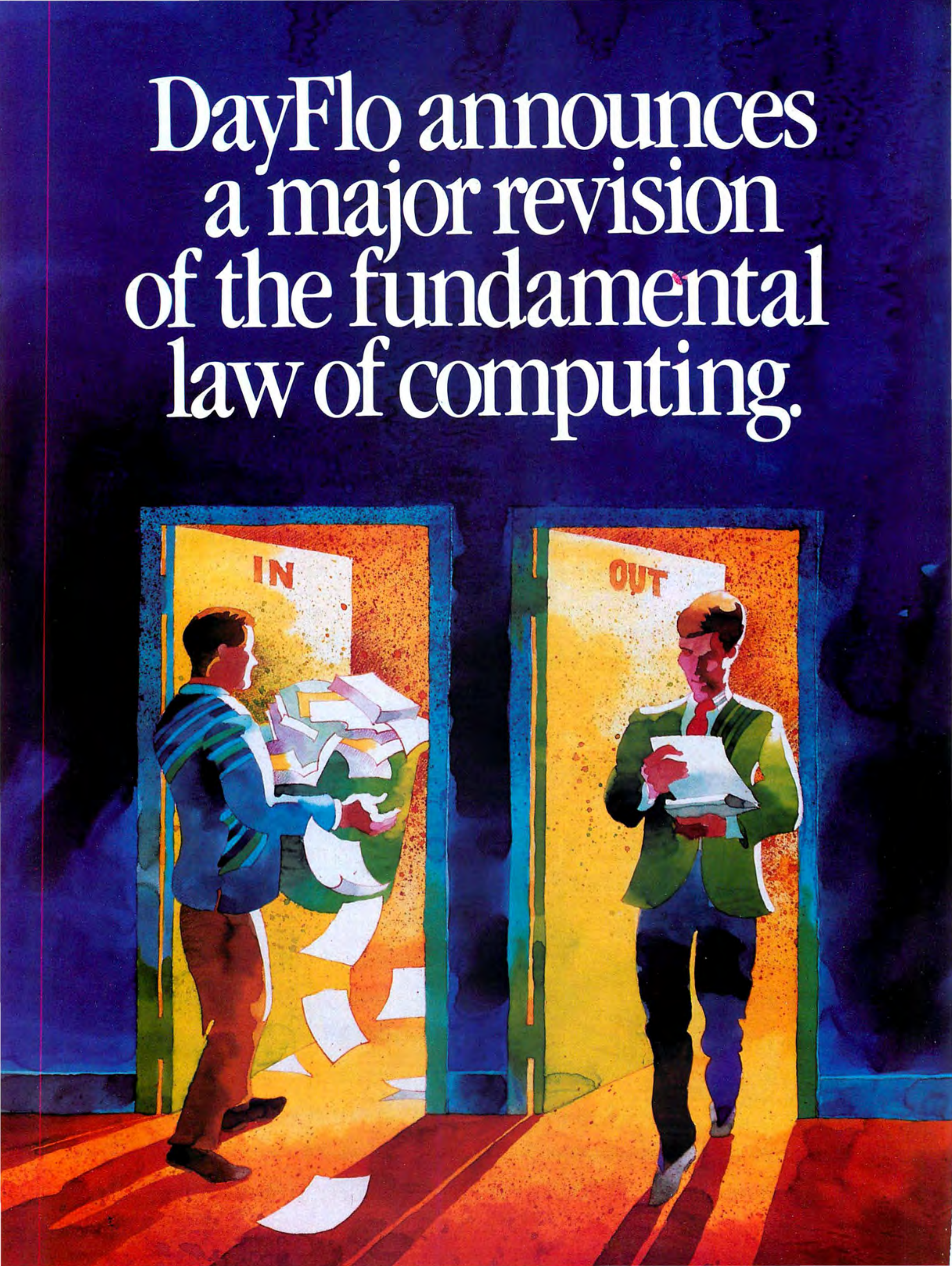
DayFlo announces a major revision of the fundamental law of computing.
IN
OUT

Garbage in, garbage out.

Since computers were invented, the conventional wisdom has held that input that doesn't conform to the computer's highly structured needs will result in unintelligible output.

Which meant that you had to learn to think like a computer in order to use one.

Trouble is, the world isn't organized to suit computers. Data is never collected in the way you want to retrieve it. That's why traditional, rigidly structured databases often wind up hindering your work more than they help.

DayFlo offers a new approach to database management needs. It's a Fluid Format™ Personal Information Manager. Which means it approaches the world the same way you do: taking in unorganized data and organizing it into meaningful information.

DayFlo is a powerful tool for your IBM® PC XT. It accepts both structured and unstructured data. When you want to extract information, just type in the key words you're looking for. Instantly, DayFlo organizes the data according to your criteria. And reorganizes it according to new criteria whenever you wish.

Information from other programs, spreadsheets, word processing or accounting files, virtually any data in the system can be assimilated by DayFlo. And once the information is at hand, DayFlo lets you manipulate it at will to produce letters, memos, reports and much more. You can work at your computer the same way you work at your desk, even switching quickly from task to task, without ever losing your place.

DayFlo's concept is as simple as it is revolutionary. You no longer have to think for the computer. Instead, it can help you think better for yourself. Which leads, inevitably, to a brand-new version of computing's fundamental law.

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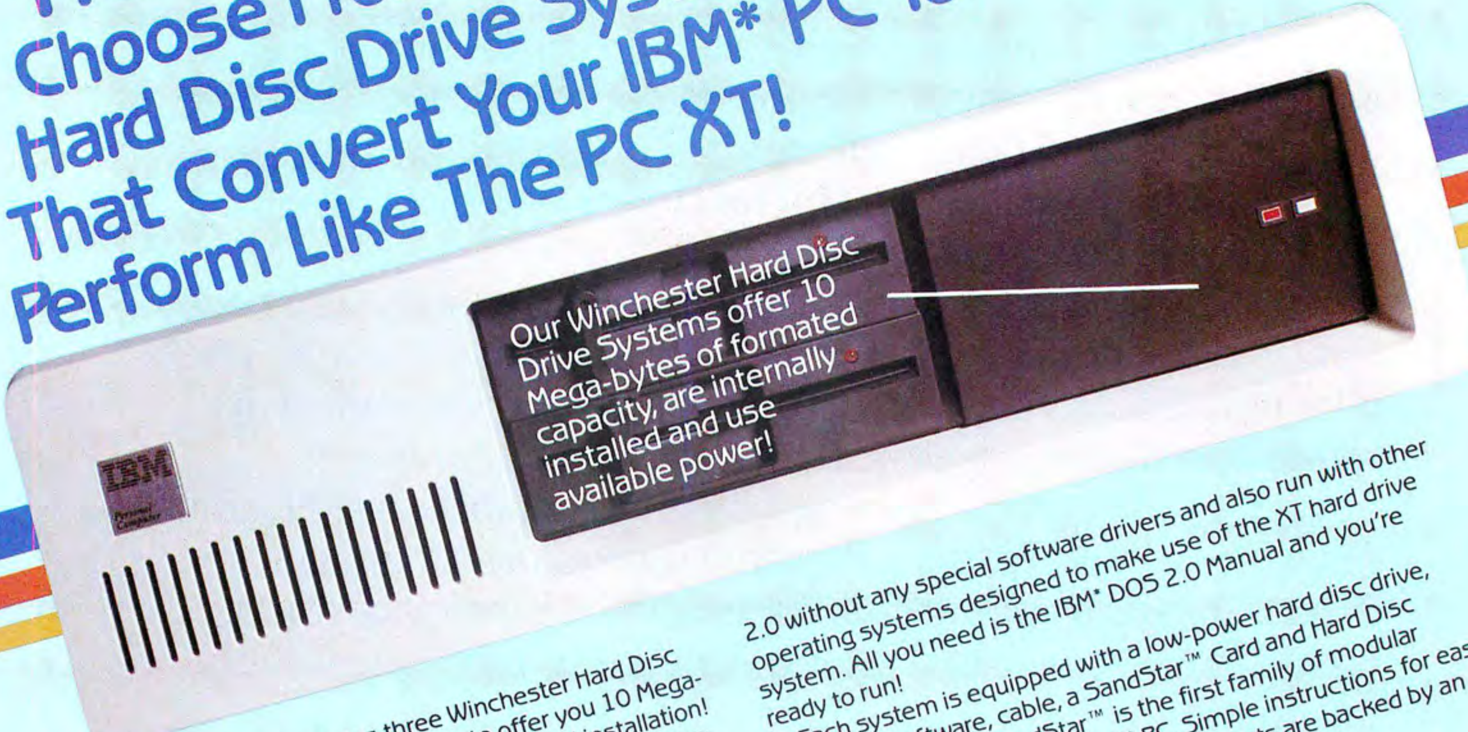
NOW! Choose From 3 Hard Disc Drive Systems That Convert Your IBM* PC To Perform Like The PC XT!

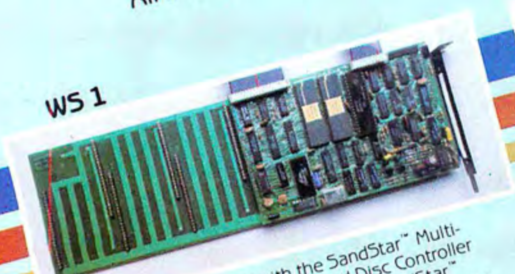


Maynard Electronics introduces three Winchester Hard Disc Drive Systems — the only drive systems to offer you 10 Mega-bytes of formatted capacity with complete internal installation! These systems offer the user countless benefits and features: capability of booting off the hard disc; additional functions while requiring only **one** card slot in your PC; and, use of available power, thereby preventing overheating problems which have affected other drives. Handling heavyweight data was never easier.

All three systems are quality engineered and work with DOS 2.0 without any special software drivers and also run with other operating systems designed to make use of the XT hard drive system. All you need is the IBM* DOS 2.0 Manual and you're ready to run!

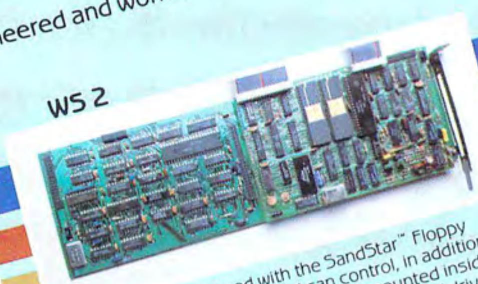
Each system is equipped with a low-power hard disc drive, complete software, cable, a SandStar™ Card and Hard Disc Controller Module. SandStar™ is the first family of modular peripherals created for the IBM* PC. Simple instructions for easy installation are included and all components are backed by an Unconditional One Year Parts and Labor Guarantee.

WS 1



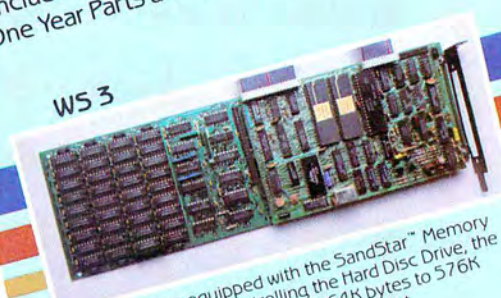
This System is equipped with the SandStar™ Multi-function card. In addition to the Hard Disc Controller Module, you can add up to three other SandStar™ Modules while using only **one** card slot. The following modules are available: Serial Port, Parallel Port, Clock Calendar, Game Adaptor, and Prototyping Module.

WS 2



This System is equipped with the SandStar™ Floppy Drive Controller Card. The Card can control, in addition to the Hard Disc Drive, two floppy drives mounted inside your PC and optionally two additional 5¼" or 8" drives mounted externally. This leaves four system slots for other expansion boards.

WS 3



This System is equipped with the SandStar™ Memory Card. In addition to controlling the Hard Disc Drive, the Memory Card allows you to add 64K bytes to 576K bytes of memory using only one card slot.

To expand your PC to perform like the PC XT, one of our Winchester Hard Disc Drive Systems is right for you. And if you have already made the wise decision to install any of Maynard's SandStar™ Cards, the SandStar™ Hard Disc Controller Module may be purchased separately.

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Δ **Individual Software** (Foster City, CA) has appointed **Robert J. Davis** vice president of product development. Davis will put his experience at Deltak to work at Individual to expand and broaden the company's line of training products.

Δ **ComputerLand Corporation**'s (Hayward, CA) 1983 sales totalled $963.4 million, a 114 percent increase over 1982, marking the sixth consecutive year that the company's sales have more than doubled over the previous year.

Δ **Faraday Electronics** (Palo Alto, CA) has signed a manufacturing contract with **Hyundai Electronics Industries** (Seoul, Korea) to manufacture standard-format microprocessor products for Faraday. Hyundai began delivery of Faraday's FE 6400 PC-compatible single-board computer in March.

Δ **Lifetree Software** (Monterey, CA) is forming a national manufacturer's representative organization for *Volkswriter* word processing products. According to Doug Cahill, sales manager for Lifetree, "We're looking for reps that are handling software and hardware lines where they call daily on retail outlets. Since *Volkswriter Deluxe*'s debut in November, a rep organization is a logical next step to increase our presence at the retail level and to capitalize on the product's popularity."

Δ **Thorn EMI Information Technology** (London, England) has formed **Thorn EMI Computer Software** to publish and market personal computer software in the United States. Thorn EMI Computer Software has opened U.S. headquarters in Costa Mesa, California, and will actively seek acquisition of select companies to complement its planned product assortment. Software currently handled by Thorn EMI includes *Submarine Commander, Computer War, Jumbo Jet Pilot,* and *Home Financial Management.*

Δ **Virtual Combinatics** (Rockport, MA) finalized agreements with three major software distribution companies: Softsel (Inglewood, CA), Softeam (Culver City, CA), and Pacific Exchanges (San Luis Obispo, CA). Virtual Combinatics initially reached customers through mail-order sales but has been turning to distributors and dealers, sometimes using nontraditional distribution channels outside the computer industry. The company's program, *Micro Cookbook*, has been sold through Cook-A-Doodle-Do, a chain of specialty kitchen stores.

Δ **Corona Data Systems** (Thousand Oaks, CA) has opened a new manufacturing center in southern California's Conejo Valley to accommodate increased demand for the desktop and portable computers marketed under Corona's own label and for Olivetti (Italy), Philips NV (Holland), and Wordplex (Thousand Oaks, CA). The new facility covers 52,000 square feet and houses 160 employees.

Δ **Lotus Development Corporation** (Cambridge, MA) reported net revenues of $53 million and income of $13.7 million, or $.98 per share, for 1983, its first full year of operation. Δ **Joyce Bartlett**, formerly Lotus's marketing communications manager, has been promoted to the new position of director of marketing communications. Bartlett will manage Lotus's advertising budget and supervise the promotions staff. Δ Lotus has appointed two officials in the company's marketing and sales departments. **Daniel McGee** is the new director of marketing programs, while **Linda Smith** joins Lotus as value-added reseller marketing manager. Both McGee and Smith come to Lotus from Digital Equipment Corporation. Δ **Rixon, Inc.** was sued for $10 million by Lotus for allegedly making and disseminating unauthorized copies of *1-2-3*.

Δ An **Okidata** (Mount Laurel, NJ) Microline 92 dot-matrix printer will join a Columbia VP Portable Computer in a climb up Mount Everest. The printer will be hauled up the Northeast Buttress route attempted by the British climber George Leigh-Mallory sixty years ago (Leigh-Mallory disappeared on the climb). The computer and printer will help track the financial and health needs of the entire team of sixteen mountaineers and fifteen Tibetan porters, and will monitor the food consumption of both the humans and the expedition's yaks. "The printer is very important," says expedition member Bob Berg. "There will be too much information to rely on just the screen. With a printout, we'll be able to jot down last-minute changes and updates." The printer will be housed in a special, portable research tent constructed of quadruple-layered material that will be heated when the printer is running.

Δ **Barbara Nicholson**, president of **B.A. Nicholson & Co.** (New York), will become president and majority stockholder of **Ferox Microsystems** (Arlington, VA). Both companies design and sell financial software.

Δ **Innovative Software** (Overland Park, KS) plans to distribute its new *Smart* integrated software through major distributors and a core of fifty dealers. These dealers will initially receive $5,000 for advertising for the first $8,000 of *Smart* they order. The integrated package

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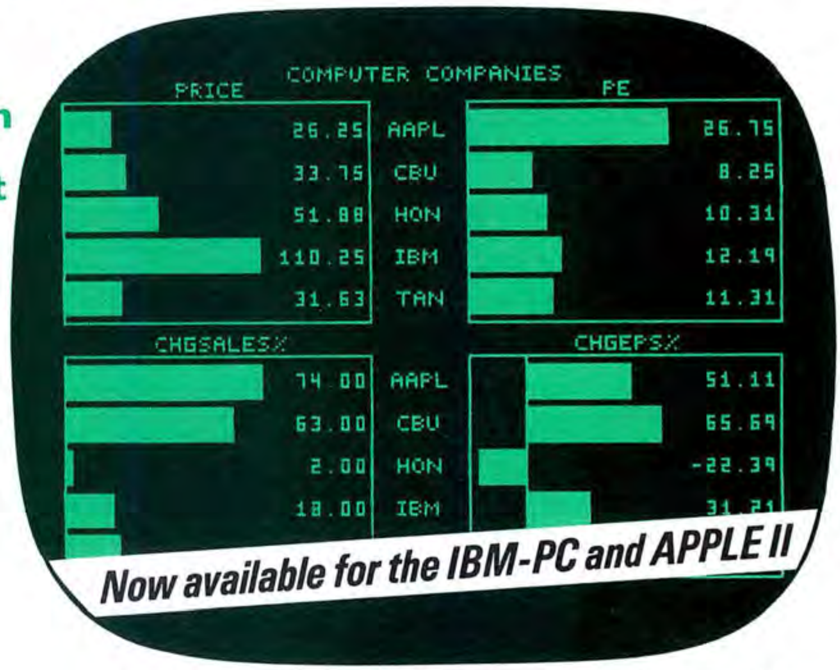

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In less than 30 seconds, you can match criteria of your own choosing against companies in the database to find only those that "fit." Request large companies with stable earnings and low P-E ratios...or, if you're more aggressive, relatively small companies with impressive sales and earnings performance. Request only companies in certain industries...or companies with low prices and high betas. You can easily customize information items, criteria sets and report formats to suit your own preference.

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includes the *Smart Word Processor*, the *Smart Data Manager*, and the *Smart Spreadsheet with Graphics*.

Δ **Computer Application Systems** (Boynton Beach, FL), currently a value-added remarketer of the IBM Series/1, is now a value-added dealer of IBM PCs for use in automated access control and time-and-attendance systems. These automated systems will use either coded electronic or magnetic identification cards to monitor how people enter and leave industrial, commercial, public, and military facilities.

Δ **Infoware** (Nashville, TN), a marketer and distributor of software to financial institutions, has become a subsidiary of **InnoVision** (Memphis, TN), itself a spinoff of the internal data processing division of Union Planters National Bank.

Δ **Marc E. Folley** has been appointed to the new position of director of sales and marketing for **Amdek Corporation** (Elk Grove Village, IL). Go Sugiura, president of the firm, said Folley will be responsible for the sales administration and marketing of Amdek's products, the sales representative force, and the introduction of new products and promotions to the computer industry. Prior to joining Amdek, Folley was North Central regional manager for Apple Computer.

Δ **MicroPro International** (San Rafael, CA) has announced that **IBM Japan Ltd.** (Tokyo) will market *WordStar*, *MailMerge*, and *SpellStar* for the IBM Multistation 5550 micro to be distributed in Japan. IBM will distribute the MicroPro products through their own direct sales force, the IBM Product Center outlets, and through authorized IBM Japan distributors.

Δ **Flextronics** (Newark, CA), a manufacturer of board-level electronics, has appointed **Mike Romeri** director of logistics. Romeri came to Flextronics from Pittiglio, Rabin, Todd and McGrath, an electronics industry consulting firm, where he was manager of consulting.

Δ **Jennifer Grolemund** has joined the customer services department of **Source Telecomputing** (McLean, VA) as manager, communications. Grolemund supervises STC's communications marketing staff with responsibility for telephone marketing, assigning membership information over the phone, and coordinating staff technical and marketing training. Δ **Lynn B. Jordan** has been appointed manager, design and implementation for The Source. In this newly created position, Jordan is responsible for developing easy-to-use design standards and specifications, as well as testing and implementing all new products for The Source. Jordan brings thirteen years of computer-related experience in analyzing, developing, implementing, and supporting both large and small database systems.

Δ **Hercules Computer Technology** (Berkeley, CA) has chosen **Hi-Tech Publicity Consultants**

Organize your non-IBM monitor with Curtis

NEW! Reduce monitor glare and improve sight angle with Curtis' new, universal UNI-1—the low profile (only 2"), tilt and swivel base designed to fit any non-IBM monitor*.

UNI-1 Low Profile, Universal Tilt and Swivel Base. 49.95
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How about turning your non-IBM monitor ON (or OFF) at the same time as your system?

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(for Princeton Graphics Systems and Quadchrome Displays)
SS-I System Stand. 24.95
(to position IBM PC Systems Unit vertically)
EC-I 3' Extension Cable Set. 49.95
(for IBM PC Monochrome Display)
EC-II 3' to 9' Extension Cable 39.95
(for IBM PC keyboard)
EC-IV 3' Extension Cable Set. 57.95
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Δ **ACI Computer Corporation** (Fremont, CA), maker of unlimited data access systems for the XT and compatibles, has appointed high-technology business consultant **Stephen T. Irwin** as vice president, sales, and **Joseph Borges, Jr.**, as director of product marketing. Both men were elected to ACI's board of directors. Irwin comes to ACI from his own company, which directed business and management team formation for a variety of high-technology startup companies in the San Francisco Bay Area.

Δ **California Software Products** (Santa Ana, CA) has appointed two new vice presidents: **Catherine E. Way**, vice president of operations, and **Elizabeth Richell**, vice president of sales and distribution. California Software's *Baby/34* allows the IBM System/34 RPG II to run on the XT. Way will be responsible for the production and the delivery of the *Baby/34* system; Richell will look after its sale and distribution.

Δ **Digital Research** (Pacific Grove, CA) has acquired **Owlcat International** (Chicago, IL) and will introduce a new line of software packages designed to help college-bound high school students prepare for the SAT.

Δ **Cdex Corporation** (Los Altos, CA) has signed a contract with **IBM** (Boca Raton, FL) under which IBM will distribute Cdex's *Cdex Training for dBase II, Cdex Training for VisiCalc, Cdex Training for WordStar, Cdex Training for CP/M-86, Managing Your Business with Multiplan*, and *Managing Your Business with 1-2-3*. IBM will be marketing the products through its marketing representatives and Product Centers.

Δ **Microcom** (Norwood, MA) has licensed its Microcom Networking Protocol (MNP) to six software and telecommunications firms: IE Systems (Newmarket, NH), Sorcim (San Jose, CA), System Software Services (Hoffman Estates, IL), Hayes Microcomputer Products (Norcross, GA), International Phasor Telecom Ltd. (Vancouver, BC), and International Computer Ltd. (Great Britain).

Δ **Oracle Corporation** (Menlo Park, CA) has created a consumer marketing group to support the firm's microcomputer product line. **H. Michael Kane** has joined the firm as vice president, consumer marketing, for the microcomputer products division. Kane is responsible for all consumer marketing activity for the Oracle relational database management system, and reports to Umang Gupta, vice president and general manager of the microcomputer products division.

Δ **Dynatech Microsoftware** (Niles, IL) exceeded $1.3 million in sales of its software products for the six months ending early in 1984. "This may represent a record start for any company offering microcomputer programs other than games or those used for specific single-purpose applications," said **Warren Shore**, Dynatech president. Dynatech developed the CodeWriter family of programs: *Home FileWriter, FileWriter 2, AdventureWriter, Dialog*, and the *Elf System*.

Δ Stanford and Johns Hopkins universities have selected **Software Solutions**'s (Milford, CT) *Dataease* for use in administrative and academic information management. The University of Texas, Austin, has selected *Dataease* as the exclusive database management system to be used for administrative purposes. Δ Software Solutions has signed a major contract with **Markt & Technik**, West Germany's largest software distributor, granting distribution rights for *Dataease* and *DOSease* in Europe's German-speaking countries. The programs will be translated into German. Markt & Technik is an international company that owns M&T Publishing in Palo Alto, California, and *Business Software* magazine and *Dr. Dobb's Journal*.

Δ **Fox & Geller** (Elmwood Park, NJ) has expanded its marketing/sales training, promotional, and support programs to handle a projected 60 percent rise in product shipments beginning in the second quarter of 1984. The projected volume increase is attributed to the January release of *Grafox*, a graphics program for the PC; the April release of *Oz: Management Control*; and the recent rise in sales of *QuickCode* and *dGraph*. Δ Fox & Geller has reached a software distributor agreement with **Sperry Corporation** and will provide its *dBase II* enhancement programs for distribution with the Sperry Personal Computer.

Δ **Ronald N. Mickwee**, president and CEO of **Eagle Computer**, (Los Gatos, CA), has been named vice chairman of the board by the microcomputer company's board of directors. Mickwee first joined Eagle as an executive vice president, chief operating officer, and a member of the board of directors in April 1983. In June 1983 he was appointed president of the company, and in August 1983 he assumed the additional position of chief executive officer, a position previously held by Eagle chairman Charles A. Kapperman.

Δ **SKU** (Berkeley, CA), a national distributor of personal and small business computer software, has named **John Billington** vice president of finance; he will oversee all accounting and MIS functions for SKU. Prior to joining them, Billington was manager of acquisitions for McKesson Corporation, parent company of SKU and a wholesale distributor of pharmaceuticals, drug and health supplies, wine, spirits, and chemicals. ▲

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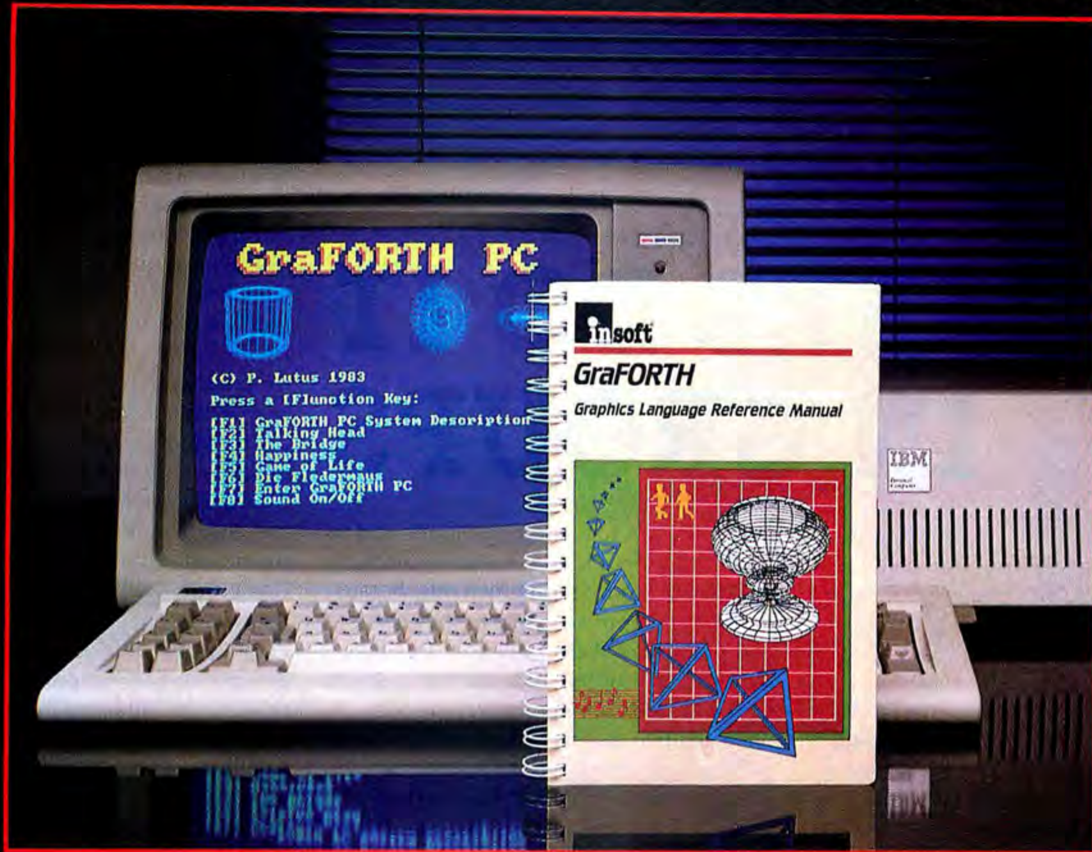

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GraFORTH gives you all the tools you need to turn mind's eye imaginings into real-time two and three-dimensional masterpieces. Birds sing. Planes fly. Boats sail off into the sunset. Quickly. Easily. With a resolution quality that's absolutely uncanny.

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Plot points, draw lines and fill areas in as you go.

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Use the Turtlegraphics function to draw line shapes rapidly at any angle.

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GraFORTH operates on the IBM PC and compatibles. Also available for the Apple II, II Plus, IIe and III.

USERS DO IT IN GROUPS

It's time for the third *Softalk* more-or-less-annual user group roundup (see the May 1983 and July 1982 issues for previous roundups). This is our listing of all the IBM PC-oriented user groups we know of in this country and Canada. We're sure the list isn't exhaustive (and some of it could be out of date by the time you read this). But if you're looking for a user group, here's a place to start.

For those of you who are relatively new to the PC scene and aren't sure what a user group is for or about—here's a partial answer:

User groups are an invaluable source of practical information. Magazines do what they can to answer questions and to provide communication between readers; but they do so rather inefficiently, because of the number of subscribers they serve and because of the production time they require (most of the material that appears in *Softalk*, for example, is prepared six weeks to two months ahead of publication). Hardware and software vendors may be chary of support for some of the same reasons (the number of supplicants)—and in some cases, of course, for reasons of their own as well. For many kinds of nuts-and-bolts problems—problems about how to make software work with hardware, hardware work with hardware, software work with software, and so on and on—your best hope for help is your local user group.

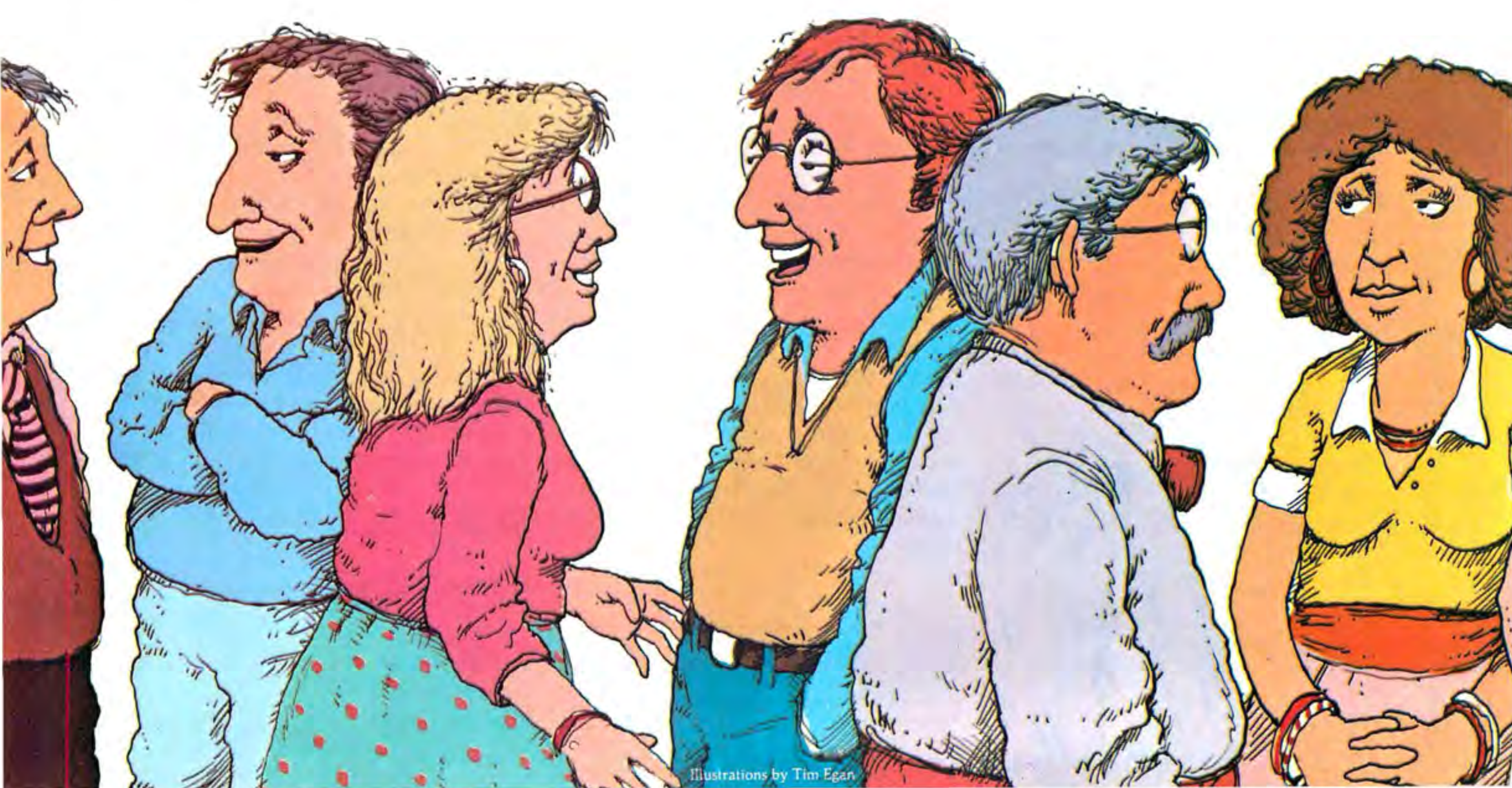
Quite apart from their value as problem-solving agencies, moreover, user groups play a vital educational role.

You'll notice that many of the groups listed on the following pages include SIGs; these are special-interest groups, subdivisions of a user group comprised of members interested in a particular topic. SIG topics cover the gamut. Many groups (San Fernando Valley, California; the University of South Florida; the Northeast Indiana IBM-PC Club; the New York PC Users' Group, among others) have SIGs for beginners. Others have SIGs that focus on particular programming topics (Pascal, BASIC, Modula-2, Forth, Xenix, among others) or applications (word processing, data management, graphics, for example). Various groups have SIGs focused on PC-mainframe communications, and at least one group (Baltimore) has a SIG devoted specifically to issues of PC-compatibility. (There's also at least one entire user group—in San Antonio, Texas—devoted to PC-compatible machines.)

Many user groups maintain libraries of public-domain software that they make available to members either for free or at a nominal cost (see "The Public Library," page 82). And some groups offer dial-up bulletin-board services that facilitate the exchange of public-domain materials.

Groups range in size from a handful of members to a humonglehood; among the

The listing was compiled by Kathy Talley-Jones and Jean Varven.


Illustrations by Tim Egan

latter category are the Silicon Valley Users' Group (Sunnyvale, California), the aforementioned NYPCUG, and the Boston-area group (which is actually a SIG of the gigantic Boston Computer Society). Small groups are probably new groups; rapid growth is the rule.

Groups typically meet once a month plenarily. SIG meetings in some places are held on the same evening or day as the full session; elsewhere they're separate events entirely. Plenary meetings often feature a software or hardware presentation given either by a group member or by a representative of an outside vendor.

In addition to all the other forms of support they provide, most user groups offer their members a monthly newsletter. This may be anything from a couple of pages of photocopied computer printout containing minutes of the most recent meeting to a miniature magazine, professionally typeset and printed, complete with paid advertisements, illustrations, feature articles, short programs, patches to existing programs, book reviews, surveys of computer magazines, letters, question-and-answer columns, and you name it. A subscription to the club newsletter is likely to be worth the annual membership dues, all by itself.

Quite a number of user organizations have been kind enough to include *Softalk* on their mailing lists; we thank all those who have done so.

Here's a somewhat random sampling of recent newsletter contents from a variety of locales:

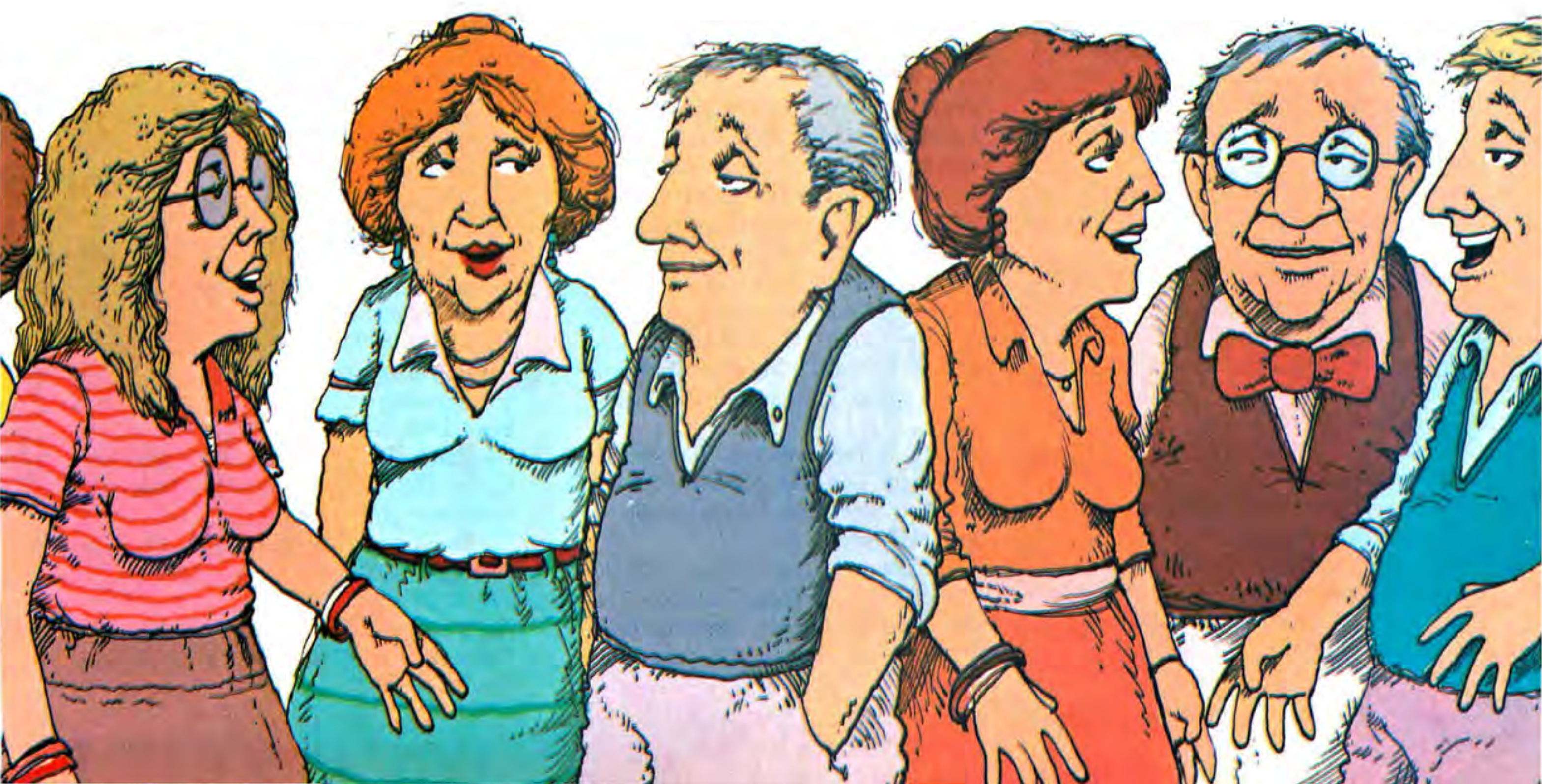
The HAL-PC group (the Houston Area League of IBM-PC Users) has run articles lately on parity checking, the installation of half-high disk drives, and on the workings of their public-domain library; The IBM PC Users Group of Winnipeg has been running a feature called "Computereze for the Neophyte"—a glossary of terms (the editor of the newsletter accepts anonymous requests placed in a mailbox at the club's meeting hall); The Personal Computer Club of Toronto has published articles on DOS function calls, undocumented commands in BASIC 2.0, and *ProKey*; the newsletter of the Central Texas IBM PC User Group has carried a *WordStar* patch, a print spooler program, and a summary of its public-domain library; and the North Texas Personal Computer Users Group has printed an extensive article on the problems of the PC*jr*.

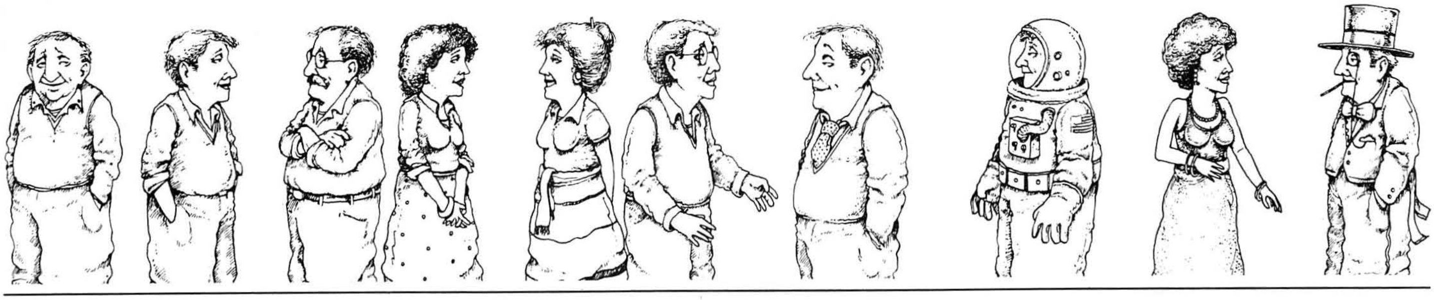
Many of the newsletters have commented on the amount of work required to maintain an active, vital user organization; most groups, it seems, are in need of more people to share the responsibilities. The Modesto-Turlock (California) IBM-PC User Group, for example, appeared for a while to be on the verge of folding because they were having trouble getting people to run for office. The back page of the Boston Computer Society newsletter regularly carries an ad requesting volunteers.

Burgeoning membership rosters and a constantly expanding agenda are the most obvious and universal trends. Another noteworthy development is a growing desire on the part of user groups to share information with one another; many of the clubs exchange newsletters with one another and reprint each other's programming contributions (with appropriate credit).

Perhaps the best way to summarize the spirit of user-group activity is to quote the March 1984 issue of *BITS and BYTES*, the newsletter of the Borderline IBM PC User's Group (Bellingham, Washington). Its editor, Larry Jones, writes:

What you are reading here are the things the members of our group have found out. No hype, no egos, just ground floor, grass roots information straight from the source—you—the members of the Borderline IBM PC User Group that gather the information together and get it to the newsletter editor. I encourage any of you that think that the things you learn are not important enough to share to think again. Someone wants to be where you are now. Help yourself via helping others by sharing what you are learning about your PC now. ▲





ALABAMA
Birmingham. Fred Hilbers, Birmingham IBM PC User Group, Box 19248, Birmingham, AL 35219-9248; 205-879-3716. Meets first Sunday, 3 p.m., except on holiday weekends. Dues $20 per year; newsletter.
Mobile/Pensacola. Jim McGinnis, 124 Meadow Wood Loop, Daphne, AL 36526; 205-626-9558. Meets third Saturday.
Montgomery. Tony Drake, Montgomery PC Users Club, 3505 McGehee Road, Montgomery, AL 36111; 205-281-6100.

ALASKA
Anchorage. Mark Bolzern, General Computer Services, 213 West Sixth Street, Anchorage, AK 99501; 907-338-6263. Meets third Thursday. Dues $10 per year. Bulletin board.
Anchorage. Anchorage IBM PC & Compatible User Group, 3605 Arctic Boulevard, Box 1320, Anchorage, AK 99503; 907-562-2161, ext. 1320. Meets second Thursday. Dues $20 per year; $10 for each additional family member at same address. Newsletter; SIGs, bulletin board.

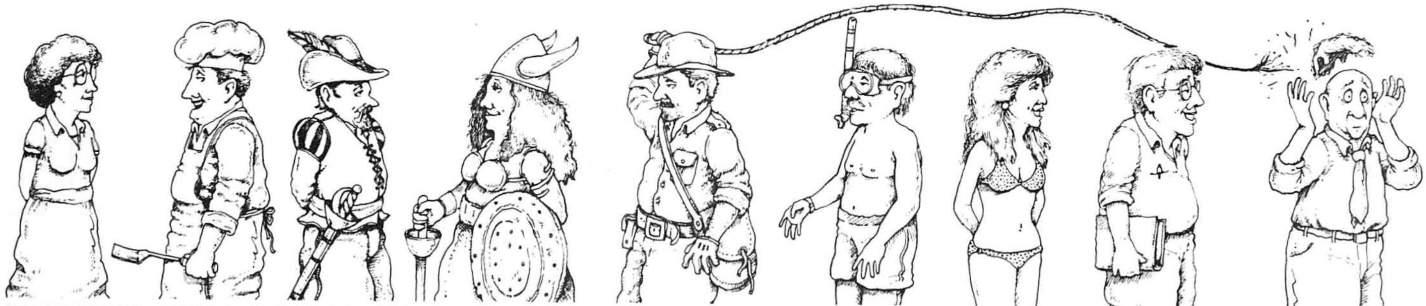
ALBERTA
Edmonton. Gerry J. Danen, 106 Abbotsfield Road, Edmonton, Alberta T5W 4S9; 403-474-0732. Meets third Tuesday.

ARIZONA
Mesa/Tempe. Margaret Mead, 2119 East Pueblo, Mesa, AZ 85204; 602-892-8008. Dues $5 per year. Newsletter.
Phoenix. Jim Serbin, Phoenix IBM PC Users Group, Box 44218, Phoenix, AZ 85064; 602-954-7519. Meets third Tuesday, Sir Georges Royal Buffet, 208 West Indian School Road, Phoenix. Dues $25 per year. Newsletter; SIGs, bulletin boards.
Phoenix. Lisa May, IBM PC Idea Exchange, c/o United Systems Corporation, 1074 East Sandpiper Drive, Tempe, AZ 85283; 602-831-9363. Call or write for meeting information.
Tucson. Theresa Baudier, Box 1489, Tucson, AZ 85702; 602-293-0611. Meets third Tuesday. Dues $10 per year. Newsletter.

ARKANSAS
Little Rock. Charles R. Hicks, Razorback PC Club, 1165 Union National Plaza, Little Rock, AR 72201; 501-371-0068. Meets first and third Monday, 5:30 p.m., First Federal Building, Capitol and Broadway. Dues $15 per year.

BRITISH COLUMBIA
Vancouver. Mike Street, Box 48517, Vancouver, British Columbia V7X 1A2; 604-271-3883. Meets third Wednesday. Newsletter.
Victoria. Kevin Morrison, 2175 Lansdowne Road, Victoria, British Columbia V8P 1B5; 604-592-1320. Dues $25 per year. Call for information.

CALIFORNIA
Bakersfield. Bill Peacock, Kern IBM PC User Group, 1400 Easton Drive, #107, Bakersfield, CA 93309; 805-322-9298.
Diablo Valley. Alfred Hunt, Diablo Valley PC, 1415 Oakland Boulevard, #101, Walnut Creek, CA 94596; 415-687-8037. Dues $30 per year. Newsletter; SIGs; bulletin board.
Fresno. Raul Betancourt, 6750 North Woodrow, Fresno, CA 93710; 209-294-2788. Meets first Monday. Dues $15 per year. Newsletter.
Gilroy. Lee Wersel, IBM PC User Group, 7255 Orchard Drive, Gilroy, CA 95020.
Los Angeles. Neil Zachary, Box 4136, Los Angeles, CA 90028; 213-937-1314. Meets second Tuesday. Dues $35 per year. Newsletter.
Marin County. William O. Ward, Marin Sonoma PC Users Group, 21 Tamal Vista Boulevard, #186, Corte Madera, CA 94925; 415-927-1212. Meets last Tuesday. Dues $4 per month. Newsletter; bulletin board.
Modesto/Turlock. Modesto/Turlock IBM PC User Group, Box 5122, Modesto, CA 95352. Write for information. Newsletter; SIGs; software library.
Orange County. Harvey Pregler, IBM PC SIG, Box 76010, Orange, CA 92665; 714-996-6458. Meets first Sunday. Dues $15 regular membership; $10 for students and seniors; family memberships available. Newsletter, PC public domain library.
Orange County. Glenn A. Emigh, 1533 Sherwood Village Circle, Placentia, CA 92670; 714-996-4464. Meets second Wednesday.
Orange County. NOCCC IBM PC User Group, John Buckle, 14524 Rio Blanco Road, La Mirada, CA 90638; 714-522-0586. Meets second Tuesday, Sunnyhills Racquet Club of Fullerton. Dues $24 per year. Newsletter.
Pomona Valley. Roy Livingston, Pomona Valley IBM PC User Group, 406 West Baseline, La Verne, CA 91763; 714-596-8150. Meets third Monday, Galileo Hall, Claremont Harvey Mudd College.
Redding. Ken Daniels, Redding Area PC Society, 2516 Park Marina Drive, #6, Redding, CA 96001; 916-243-4411.
Redondo Beach. John Helms, Greater South Bay IBM PC User Group, Box 1937, Redondo Beach, CA 90278; 213-378-3304. Meets third Thursday. Dues $25 per year. SIGs; software library; newsletter. Call for information.
Sacramento. David Burhans, Jr., Ph.D., Sacramento IBM PC Users Group, 5800 Topelo Drive, Sacramento, CA 95842; 916-723-9745. Meets third Wednesday, 7:00-9:30 p.m., SMUD Foothills Service Center Training Room A, 5026 Don Julio Boulevard, North Highlands. Dues $10 per year. Newsletter, SIGs.
Sacramento. Milt Hull, Box 685, Citrus Heights, CA 95610; 916-334-2979. Meets third Wednesday. Dues $12 per year. Newsletter; SIGs.
San Bernardino. Lou Bednorz, Inland PC USRGP, 23147 Palm Avenue, Grand Terrace, CA 92324; 714-825-9660. Call for information.
San Carlos. Tex Thoman, Peninsular IBM PC User Group, 376 El Camino Real, San Carlos, CA 94070; 415-593-8275. Meets first Saturday.
San Diego. Cubic Computer Club, IBM SIG, Box 85587, 9333 Balboa Avenue, San Diego, CA, 92138; 619-277-6780.
San Diego. Joe Dorner, Box 87770, San Diego, CA 92138; 714-676-5856. Meets third



Tuesday. Newsletter.
San Fernando Valley. Ray Kirk, 5923 Murietta #2, Van Nuys, CA 91401; 818-994-3811. Meets second Thursday. Dues $15 per family.
San Fernando Valley. David Nussbaum, 11558 Riverside Drive, Suite 207, North Hollywood, CA 91602; 818-985-8337. Meets first Tuesday. Dues $15. Newsletter; software library; SIGs.
San Fernando Valley. David Nussbaum, Studio City PC and Compatible Computer Club, 11558 Riverside Drive, Suite 207, North Hollywood, CA 91602; 818-985-8337. Meets first Friday.
San Francisco. Mark Slichter, UCSF IBM PC User Group, School of Nursing, N-319Y, UC San Francisco, San Francisco, CA 94143; 415-666-2763.
San Francisco. E. M. Brioski, PC User Group, Box 661, San Francisco, CA 94101; 415-626-0620. Meets third Thursday. Dues $25 per year. Newsletter.
San Francisco. Charlie Vella, Software Librarian, SF PC User Group, 4411 Geary Boulevard, #33, San Francisco, CA 94118. Meets third Monday at Fort Mason Center, Building A. Dues $25 per year. Newsletter; SIGs; very large library of user-supported programs.
San Jose. Syd Geraghty, 7219 Shea Court, San Jose, CA 95139; 408-629-9402. Dues $25. Call for meeting information. Newsletter.
Santa Barbara. Stu Swartz, 721 Cliff Drive, Santa Barbara, CA 93109; 805-966-2919. Meets third Thursday. Dues $10.
Santa Cruz County. Joe Matus, 206 Hill Street, Watsonville, CA 95076; 408-722-0304. Call for information.
Stanford/Palo Alto. Linda de Sosa, Box 3738, Stanford, CA 94305; 415-856-6281.
Sunnyvale. Elvin H. Bollet, Silicon Valley Computer Society, Box 60506, Sunnyvale, CA 94088; 408-243-1154. Meets second Wednesday, Theater, Westinghouse Engineering Center. Dues $30. Newsletter, SIGs, software library.
Temecula. Joe Dorner, Rancho California Computer Club, Box 651, Temecula, CA 92390; 714-676-5856. Bulletin board, 714-676-3378.
Thousand Oaks. Paula Larson, 1264 El Monte Drive, Thousand Oaks, CA 91362; 805-495-9435. Meets last Thursday, 7:30 (beginner's group, 6:30), Glendale Federal Building, 3967-A East Thousand Oaks Boulevard. Dues $20 per year.

COLORADO

Boulder. Howard Weissman, PC Users Group of Colorado, Box 944, Boulder, CO 80306; 303-443-5528 (evenings). Meets last Thursday, University of Colorado, Duane Physical Labs, Boulder.
Boulder. Steve Leibson, Denver User Group, 4040 Greenbriar Boulevard, Boulder, CO 80303; 303-494-4062. Dues $12. Newsletter.
Colorado Springs. Cleve Bell, Colorado Springs IBM PC User Group, Box 16256, Colorado Springs, CO 80935. Meets third Thursday. Software library; newsletter, SIGs.
Loveland. Joan Brown, Front Range PC User Group, 813 Engleman Place, Loveland, CO 80537; 303-667-6059.

CONNECTICUT

New Canaan. Davis Foulger, Connecticut IBM PCUG, Box 291, New Canaan, CT 06840; 203-744-4002.
New Haven. Philippe Jeanty, Yale Medical School User Group, School of Medicine, 333 Cedar Street, Box 3333, New Haven, CT 06510; 203-785-2173.
Storrs. UCONN PC Club, Box 542, Storrs, CT 06268-0542.
West Hartford. Rich Paterson, ComputerLand, 131 South Main Street, West Hartford, CT 06110; 203-561-1446. Meets first Wednesday. Newsletter.

DISTRICT OF COLUMBIA

Washington. Gary Eiserman, Financial Institutions User Group of the DC Metropolitan Area, c/o Rent-A-Computer, Inc., Penthouse #8, 4853 Cordell Avenue, Bethesda, MD 20814.
Washington. Mike Todd, Capitol PC User Group, 4910 43rd Street, N.W., Washington, DC 20016; 202-364-2467. Meets third Monday and following Tuesday. Dues $25 per year. Newsletter; SIGs; bulletin board, 703-560-0979; software exchange.

DELAWARE

Wilmington. PC Professional User Group, Box 2350, Wilmington, DE 19899.

FLORIDA

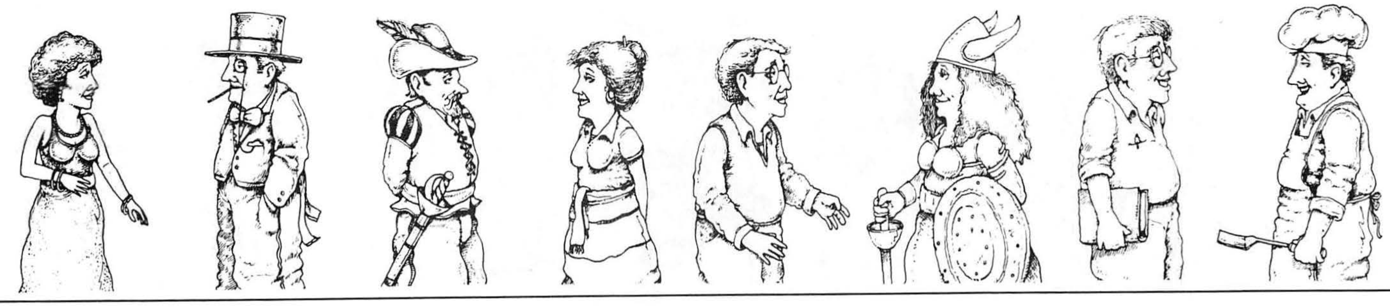
Boca Raton. Elizabeth Bates, PC Users Group of Boca Raton, College of Boca Raton, 3601 North Military Trail, Boca Raton, FL 33431; 305-994-0770, ext. 14 or 83. Call for information.
Jacksonville. Stephen D. LeBar, Northern Florida Amateur Computer Club, 10921 Kuralei Drive, Jacksonville, FL 32216.
Merritt Island. John Key, Space Coast PC User Group, 1540 Monte Carlo Cou, Merritt Island, FL 32952.
Miami. Miami PC User Group, 6925 South West Sixteenth Street, Miami, FL 33155; 305-262-1891, 305-940-1755. Call for information.
North Miami. Joel Hershkowitz, Miami PC User Group, 2350 N.E. 135th Street, #1201, North Miami, FL 33181. 305-940-7566.
Sarasota. Richard Reynolds, Manasota IBM-PCUG, 1102 Mallorca Drive, Bradenton, FL 33529; 813-792-5400. Meets third Wednesday. Dues $15. Newsletter.
South Florida. Mario I. Guerrero, South Florida Computer Group, Box 22267, Fort Lauderdale, FL 33335; 305-752-6737. Write for information. Newsletter.
Tampa. Saul Lowitt, Ph.D., U.S.F. IBM PC User's Group (SVC409), University of South Florida, 4202 East Fowler Avenue, Tampa, FL 33620. Write for information.

GEORGIA

Atlanta. Randy Bullard, 2965 Atterberry Court, Decatur, GA 30033; 404-634-9585. Meets second Wednesday. Dues $20. Newsletter.
Macon. L. Keitt Dantzler, Middle Georgia Computer Club, Box 5705, Macon, GA 31208; 912-477-7009.

HAWAII

Honolulu. Doug Long, 1750 Kalakaua, Suite



3-168, Honolulu, HI 96826; 808-735-5769. Meets second Tuesday. Dues $10. Newsletter.
Pearl City. Arthur W. Becker, IBM PC User Society, Box 591, Pearl City, HI 96782. Write for information; include return postage.

IDAHO

Boise. Bruce Burns, ComputerLand, 11872 Chinden Boulevard, Boise, ID 83704; 208-939-2433. Call for information.

ILLINOIS

Chicago. Glenn Yunashko, Association of Personal Computer Users, 323 South Franklin, #804, Department A-202 Chicago, IL 60606. Meets fourth Saturday, Lecture Hall D1, University of Illinois, Chicago Circle. Write for information. Special seminars.
Chicago. J.A. Tanenbaum, Loop and Lakefront IBM PC User Group, 336 West Wellington, Chicago, IL 60657; 312-248-1774. Call for information.
Chicago. James L. Szafranski, 5195 Castaway Lane, Barrington, IL 60010; 312-934-8133. Meets second Thursday. Dues $15.
Evanston. Dan S. Tong, Corona and Other PC Compatibles User Group, 1310 Maple Avenue, Evanston, IL 60201; 312-864-7549.

INDIANA

Fort Wayne. George Gynn, 9904 West Goshen Road, Fort Wayne, IN 46818; 219-693-3147. Meets third Tuesday. Dues $15. Newsletter; software library, SIGs.
Indianapolis. David Reed, 6704 Hoover Road, Indianapolis, IN 46260; 317-259-7892. Meets fourth Monday. Dues: $15, single; $20, family. Newsletter.
Notre Dame. Paul E.W. Hemmeter, Notre Dame PC User Group, Box 597, Notre Dame, IN 46556; 219-239-5295.
South Bend. Terry Alley, M.D., Northern Indiana IBM PC User Group, Autumn Revolution Chapter, 325 North Frances, South Bend, IN 46617; 219-289-5506 (days); 219-291-3979 (evenings). Meets first Thursday, fourteenth floor, Saint Joseph Bank, Downtown South Bend. Call for information. Bulletin board , 219-291-5212 (300/1200 baud).
Terre Haute. Terre Haute PC User Group, Box 3174, Terre Haute, IN 47803.

IOWA

Bettendorf. Lew Roberts, Quad Cities PC User Group, Box 464, Bettendorf, IA 52722; 319-391-9437.
Cedar Falls. Lee Ann Moore, ComputerLand, Black Hawk Village Shopping Center, Cedar Falls, IA 50613; 319-277-1700. Meets first Monday.
Des Moines. Gary Wilcox, Box 246, Des Moines, IA 50301; 515-967-5880. Call for information.

KANSAS

Kansas City. Dr. R. Wayne Thompson, 11005 West Sixtieth Street, Shawnee, KS 66203; 913-631-0110. Meets first Monday. Dues $15. Newsletter.
Topeka. Becky Hinton, Topeka Public Library, 1515 West Tenth Street, Topeka, KS 66604; 913-233-2040. Meets third Monday.
Wichita. Wichita IBM PC UG, Box 18422, Wichita, KS 67218.

KENTUCKY

Lexington. Diane Skoll, Bluegrass IBM PC User Group, Computing Center, Room 72 McVey Hall, University of Kentucky, Lexington, KY 40506; 606-257-2900. Dues $5. Meets fourth Saturday.
Louisville. Robert D. Hastings, Kentucky-Indiana Personal Computer Users Group, Box 3564, Louisville, KY 40201; 502-589-0254. Dues $20 per year. Newsletter; bulletin board 502-896-4419 (6 p.m. through 9 a.m.).

LOUISIANA

New Orleans. Bob Starr, ComputerLand, 3517 Nineteenth Street, Metairie, LA 70002; 504-588-6276. Meets first and third Wednesday. Dues $18. Bimonthly newsletter.

MAINE and NEW HAMPSHIRE

Portsmouth. Cynthia Harriman, 57 South Street, Portsmouth, NH 03801; 603-436-1608. Call for information.

MANITOBA

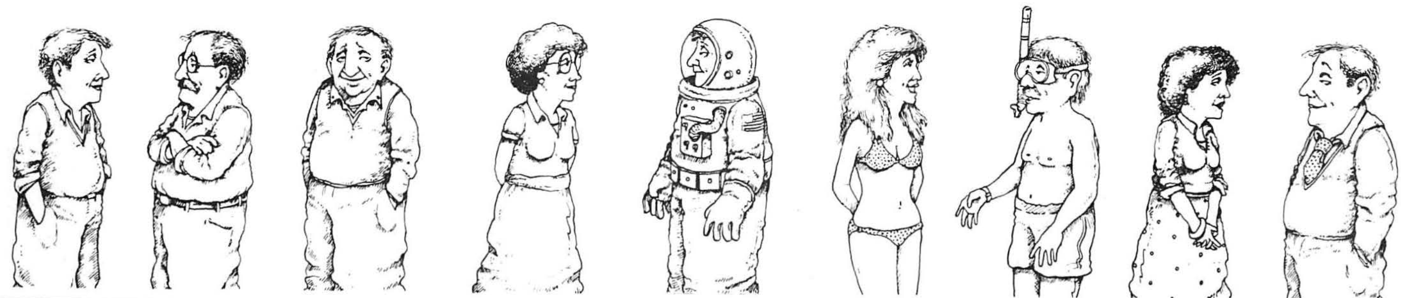
Winnipeg. Dennis Bayomi, IBM PC User Group of Winnipeg, Box 5, Station A, Winnipeg, Manitoba R3K 1Z9; 204-888-0718. Meets third Thursday. Dues: $20; $12, under eighteen; $25, family. Newsletter; SIGs.

MARYLAND

Annapolis. Bill Aherne, Annapolis PC User Group, 1409 Forest Drive, Annapolis, MD 21403; 301-268-8779.
Annapolis. George Brungot, Chesapeake PC Users Group, Box 747, Annapolis, MD 21204; 303-268-8779.
Baltimore. Larry Nickel, Columbia Data Products Users Group, Box 223, Owings Mills, MD 21117. Newsletter. Write for information.
Baltimore. Ed Honabach, Baltimore IBM PC User Group, 1910 Trout Farm Road, Jarrettsville, MD 21084; 301-666-6344 (days), 301-557-9965 (evenings). Meets first Tuesday, Baltimore Polytechnic Institute, Jones Fall Expressway (Route 83) and West Cold Spring Lane, 7:00 p.m.. Dues $15 per year. Newsletter; SIGs; buyers group.
Baltimore. Chip Hayden or Alan Burke, IBM PC Business Users, 40 West Chesapeake Avenue, Suite 300, Baltimore, MD 21204; 301-296-4600. Monthly SIG meetings; semiannual conference.
Gaithersburg. Jan Withro, Capital User Group, Box 3189, Gaithersburg, MD 20878; 703-978-1530.
Lutherville. Bob Roswell, Lutherville User Group, 1516 York Road, Lutherville, MD 21093; 301-337-5555.

MASSACHUSETTS

Belchertown. Robert L. Ward, Massachusetts IBM PC UG, Box 1014, Heritage Square, Belchertown, MA 01007.
Boston. Marie Deame, Boston Computer Society IBM PC User Group, Three Center Plaza, Boston, MA 02108; 617-731-0803 (evenings). Meets third Tuesday, 6:15 p.m., Babson College, Knight Auditorium. SIGs; newsletter; bulletin board. Address all correspondence to Box 307, Wellesley Hills,



MA 02181.
Shrewsbury. Joseph Boykin, SIG/86, 47-4 Sheridan Drive, Shrewsbury, MA 01545; 617-845-1074.

MICHIGAN
Ann Arbor. Washtenaw IBM Personal Computer User Society, Will Weber, Box 7508, Ann Arbor, MI 48107; 313-665-4407. Meets third Tuesday. Dues: $18; $12, students and seniors. Newsletter; bulletin board.
Detroit. Darrell Frappier, Southeastern Michigan Computer Organization, IBM SIG, Box 02426, Detroit, MI 48202; 313-532-1390. Dues $15. Meets second Sunday, Lawrence Institute of Technology Science Building. Newsletter, access to time-sharing computer for bulletin board and public domain software.
Grosse Point. Michael S. Skaff, Ph.D., 585 Saddle Lane, Grosse Pointe Woods, MI 48236.
Kalamazoo. R.K. Schmitt, Southwestern Michigan IBM PC UG, 2320 Crosswind Drive, Kalamazoo, MI 49008; 616-349-5381.

MINNESOTA
Minneapolis. Tom Donohue, Twin Cities PC User Group, Box 3163, Minneapolis, MN 55403; 612-473-0307. Meets second Tuesday, Wiley Hall, University of Minnesota, 6:30 p.m. Dues $24. Newsletter, bulletin board, SIGs, software library, job networking.

MISSOURI
Columbia. Jennifer DuPont, Columbia PC Users Group, 1560 Daniel Boone Boulevard, Columbia, MO 65201; 314-449-7316.
St. Louis. Dave Zumbro, Box 837, St. Louis, MO 63188. Meets second Tuesday. Dues $10. Newsletter.

NEW JERSEY
Fanwood. Mike O'Donnell, Box 42, Fanwood, NJ 07023; 201-754-7263. Meets first Friday. Dues $14. Newsletter.
North New Jersey. Irving Lang or Joe McDermott, North Jersey IBM PC, Box 497, New Providence, NJ 07974; 212-869-5066 (IL); 201-489-3877 (JM, evenings). Meets second Thursday, 6:45 p.m., Meadowlands Environment Center, Lyndhurst, NJ. Dues $20. Newsletter, SIGs.
Princeton. Simon Yeung, Princeton IBM PC User Group, Box 121, Princeton, NJ 08540. Meets third Wednesday.

NEW YORK
Buffalo. BIBMUG (Buffalo IBM Users Group), Box 1487, Buffalo, NY 14221. Meets second Monday. Write for information. Newsletter, public domain software library.
Buffalo. Linda Fall, 265 Kings Highway, Snyder, NY 14226; 716-839-0574. Meets second Monday. Dues $20. Newsletter; bulletin board.
Long Island. Marvin Freifeld, 3 Lindron Avenue, Smithtown, NY 11787; 516-724-0574. Meets second Friday. Dues $10. Newsletter; SIGs.
New York City. Helaine Head, Manhattan Micro, 360 Central Park West, New York, NY 10025; 212-222-9027. Meets first Monday. Newsletter.
New York City. Eric A. Jaffe, New York IBM Personal Computer User Group, 80 Wall Street, #614, New York, NY 10005; 212-533-NYPC. Meets third Wednesday. Dues $15. Newsletter, SIGs, bulletin board.
New York City. David Gillett, 704 Broadway, New York, NY 10003-9527; 212-864-4595. Meets third Wednesday. Dues $10 per year.
Rochester. Dale Dewey, Picture City PC Programming Club, 7284 High View Trail, Victor, NY 14564; 716-924-5565. Meets first Wednesday. Dues $12. Newsletter.
White Plains. Dave Hodgson, 822 Pines Bridge Road, Ossining, NY 10562; 914-762-5248. Meets first Thursday. Dues $15. Newsletter.

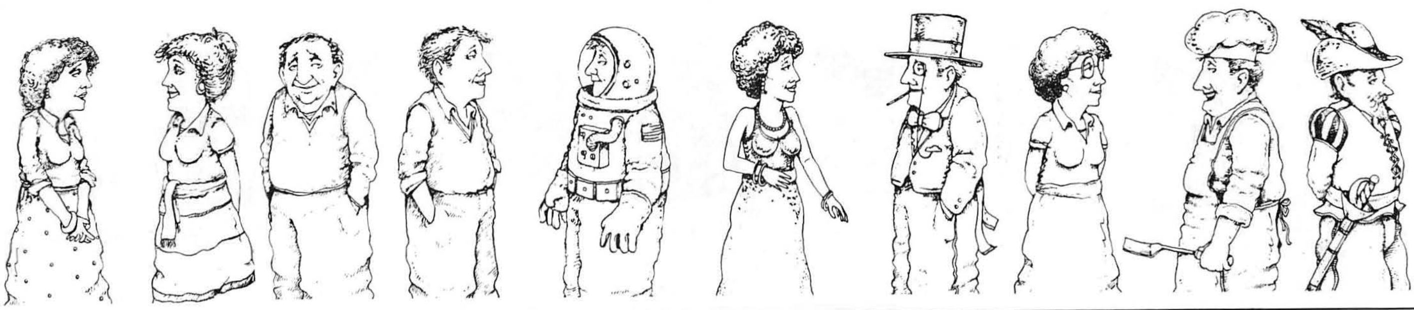
NORTH DAKOTA
Fargo. Loren D. Jones, 1339 Seventh Avenue South, Fargo, ND 58103; 701-235-7573. Meets third Monday. Newsletter.
Grand Forks. John D. Hilley, 717 Ives Street, Buxton, ND 58218; 701-847-2935. Meets first Thursday. Joint newsletter with Fargo club.

OHIO
Akron/Canton. James C. Finucane, Akron/Canton PC Users Group, 10690 Clapsaddle Avenue, Alliance, OH 44601; 216-935-0252. Meets first Monday, 7:00-9:00 p.m. Odd months: Canton, Stark Technical College, 6200 Frank Avenue, NW; even months: Akron, Akron Library, 111 Main Street. Dues $12 per year. Newsletter.
Cincinnati. Greater Cincinnati IBM PC Users Group, Randy Corgan, Box 3097, Cincinnati, OH 45201; 513-922-2692 (24 hours).
Cincinnati. Jerry Daiker, Box 3097, Cincinnati, OH 45201; 513-741-8279. Meets third Tuesday. Dues $15. Newsletter.
Cleveland. Roy McCartney, Greater Cleveland PC UG, 30704 Royalview Drive, Willowick, OH 44094; 216-944-5173. Meets first Saturday. Dues: $20, old members; $25, new members. Newsletter; software and book library; SIGs.
Warren. Jeff Russell, WRIPCA, Box 8828, Warren, OH 44484; 216-856-1446. Meets second Tuesday. Dues $15 individuals, $20 families, $25 businesses. Newsletter.

OKLAHOMA
Tulsa. Autumn Revolution, Box 55329, Tulsa, OK 74155; 918-663-3436. Dues $30 (dues include ten issues of newsletter). Software library; public domain and member-written (royalty arrangement); technical library; bulletin board; technical assistance by telephone.
Tulsa. Walt Hailey, Box 1133, Tulsa, OK 74101; 918-663-2693. Meets third Monday. Dues $10. Newsletter; bulletin board.

ONTARIO
Toronto. Andrew Hagan, The PC Club of Toronto, Box 266, Station A, Toronto, Ontario M5W 1B2; 416-881-6714. Meets third Tuesday. Dues: $20; family rates. Newsletter.

OREGON
Eugene. Greg Estes, Box 5070, Eugene, OR 97405; 503-687-0398. Meets third Thursday.
Portland. Rich Rohde, Box 2068, Beaverton, OR 97075; 503-620-6862. Meets second



Wednesday. Dues $20 per year. Newsletter; SIGs.

PENNSYLVANIA

Philadelphia. Bennett Landsman, 2041 Harbour Drive, Palmyra, NJ 08065; 609-786-1441. Meets third Saturday. Newsletter.
Pittsburgh. Victor Merrell, South Hills Computer Club, 1692 Northgate Drive, Pittsburgh, PA 15241; 412-221-6383. Meets second Thursday. Dues: $15, initiation; $10 per year. Newsletter.
Pittsburgh. Chuck Glassmire, 29 Coulter Street, Pittsburgh, PA 15205; 412-922-1022. Meets fourth Monday, 8:00 p.m., Old Engineering Hall, University of Pennsylvania. Newsletter.

SOUTH DAKOTA

Rapid City. Gary Gall, ComputerLand, 738 Saint Joe Street, Rapid City, SD 57701; 605-348-5384. Call for information.

TENNESSEE

Knoxville. Wayne Morrison, 853 West Woodchase, Knoxville, TN 37922; 615-966-1474. Meets second Monday. Dues $10. Newsletter.
Knoxville. Ross Burruss, Science Applications, Knoxville Independent User Group, Plaza Tower, #801, Oak Ridge, TN 37830; 615-482-6649. Call for information.
Memphis. Peter Vermilye, Box 241756, Memphis, TN 38124; 901-345-8760. Meets fourth Wednesday, Room 233, Dunn Building, Memphis State University. Call for information.

TEXAS

Austin. Patti Anderson, Central Texas IBM PC UG, Box 10169, Austin, TX 78766; 512-317-1221. Meets first Tuesday, 6:30, Old Quarry Branch Library. Dues $35. Newsletter; SIGS; software library.
Dallas. Bill Hood, North Texas IBM Personal Computer Users Group, 10400 North Central Expressway, #210, Dallas, TX 75231; 214-361-0304. Meets second Saturday, Jesuit High School auditorium, 9:30 a.m.
Dallas/Fort Worth. Samuel P. Cook, Southwest PC UG, 309 Lincolnshire, Irving, TX 75061; 214-253-6979. Meets third Saturday. Dues $30. Newsletter; SIGs.
Houston. Rob Taylor, Houston Area League of PC Users, Box 610001, Houston, TX 77208; 713-937-3592. Meets first Tuesday, Dunfey Houston Hotel, 7000 Southwest Freeway. Dues $25. Newsletter; bulletin board; software library; SIGs.
Lubbock. Terry Duke, LIPSIGN, Box 98117, Lubbock, TX 79499; 806-765-7009. Meets second Thursday. Newsletter, SIGs.
San Antonio. Ken Holcombe, Texas User Group, 178 Tipperary, San Antonio, TX 78223; 512-333-7163. Meets second Thursday. Call for information.
San Antonio. Mike Sullivan, Alamo PC Organization, 4807 Clemson, San Antonio, TX 78249; 512-828-7926. Meets first Thursday. Dues: $15, first year; $10 thereafter.

UTAH

Salt Lake City. Dean Bishop, Utah Blue Chips, Box 11901, Salt Lake City, UT 84147; 801-355-4617 (days); 801-561-3417 (evenings). Meets third Wednesday.

VIRGINIA

Richmond. Webb B. Blackman, Jr., Central Virginia IBM PC User Group, Box 34446, Richmond, VA 23234; 804-790-1007. Meets fourth Thursday. Dues $20. Newsletter; software exchange.

WASHINGTON

Bellingham. Paul Phillips, Borderline PC User Group, 2514 Alvarado Drive, Bellingham, WA 98226; 206-733-1248. Meets first Wednesday. Call for information. Software library, newsletter, SIGs.
Olympia. Dr. Roger Kuhrt, 2030 Baker Terrace, Olympia, WA 98501; 206-943-8755. Call for information. Newsletter.
Seattle. Sandra Stowell, PNW IBM User Group, Box 3363, Bellevue, WA 98009; 206-226-2578. Meets third Saturday. Dues $10. Newsletter.
Spokane. Maurice Feryn, Route 1, Box 394, Mead, WA 99021; 509-466-3685. Meets last Tuesday.

WEST VIRGINIA

Charleston. Farris VanMeter, ComputerLand, 224 Seventh Avenue, South Charleston, WV 25303; 304-744-7962. Meets first Wednesday.

WISCONSIN

Madison. Philip Niehoff, Box 2598, Madison, WI 53701; 608-255-7641. Meets second Wednesday. Dues $15. Newsletter.
Milwaukee. Gerald Freitag, 3028 South Eighty-Fourth Street, West Allis, WI 53227; 414-541-2600. Call for information.
Milwaukee Area. Fred Pike, Milwaukee Area IBM PC User Group, Box 305, Elm Grove, WI 53122; meets second Thursday. SIGs; newsletter; bulletin board.
Oshkosh. Valley IBM PC Users Group, R.G. Chamberlain, First Tuesday, 7:00 p.m., Wisconsin ComputerLand. Newsletter.

NATIONAL ORGANIZATIONS

International PC Owners (IPCO). Box 10426, Pittsburgh, PA 15234; 412-561-1857. Dues: U.S., $20; Canada and Mexico, $25; all others, $50. Bimonthly newsletter; 150-program software library.
Personna Computer Association. Box 759, Point Pleasant, NJ 08742; 201-840-0300. Dues $45. Newsletter, annual and regional conferences; Tymnet newsletters, tutorials, and bulletin board. Canadian affiliate: PCA, Box 251, Ajax, Ontario, Canada L1S 3C3; 416-498-9659.
UCSD p-System User's Society (USUS). Box 1148, La Jolla, CA 92038. Dues: Individual $25, quarterly newsletter, SIGs, software library, GT Telemail, semiannual conferences; institutional $500—includes reproduction rights to quarterly newsletter and software library. ▲

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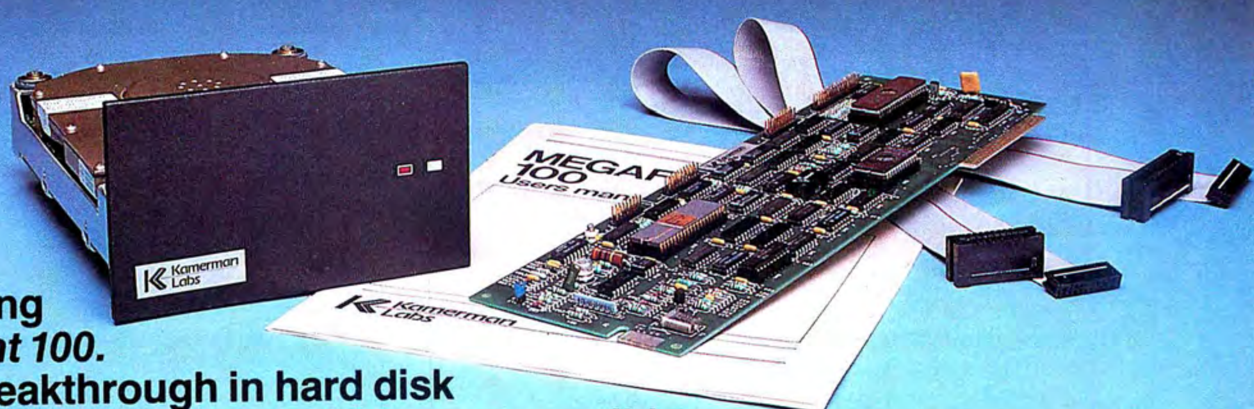

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THE PATCH PATCH

Softalk readers, ingenious, adept, and ever-helpful, like to pepper us with pokes, patches, and problem solutions. Until now, our only forum for such contributions has been the letters column, "Crosstalk." Because we get so many of these fine suggestions, however, we have decided to inaugurate a new department. "The Patch Patch" will be a sort of sixteen-bit "Hints from Heloise," and you, honorable reader, get to play Heloise.

We invite you to share with us and with fellow readers your amendments to any unprotected software—public domain or otherwise. We'll pay $35 on publication for any patch we print.

Here are the ground rules:

Please make certain that what you send is accurate. We'll do our best to test your patches, but we won't necessarily have the appropriate software or hardware.

Do not send modifications to copy-protected programs. We believe in honoring vendors' rights to protect their wares.

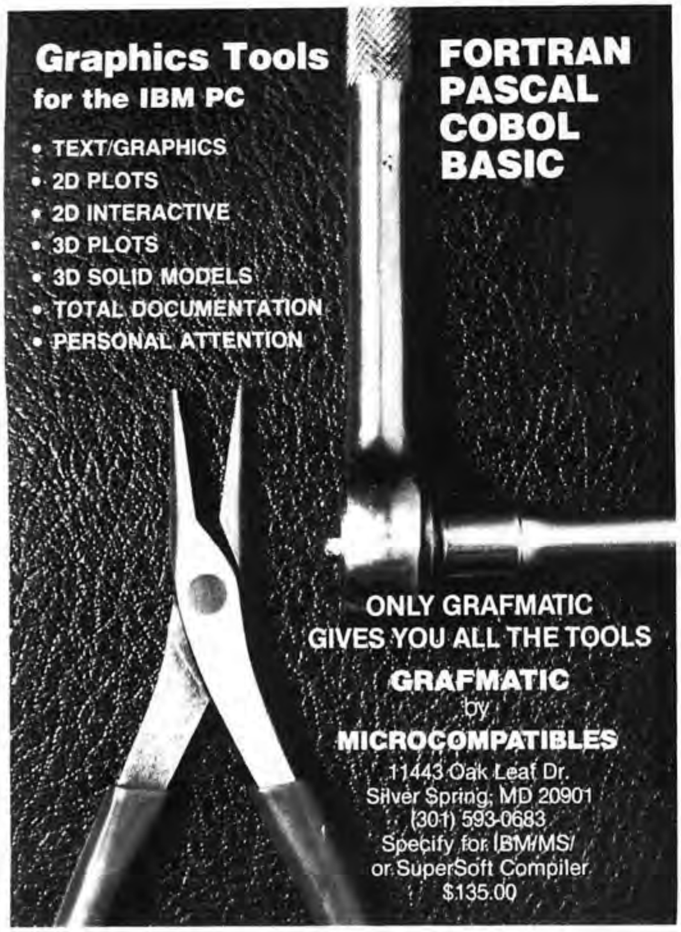
Any open program that runs on the PC, XT, Junior, Portable PC, or a PC-compatible is fair game.

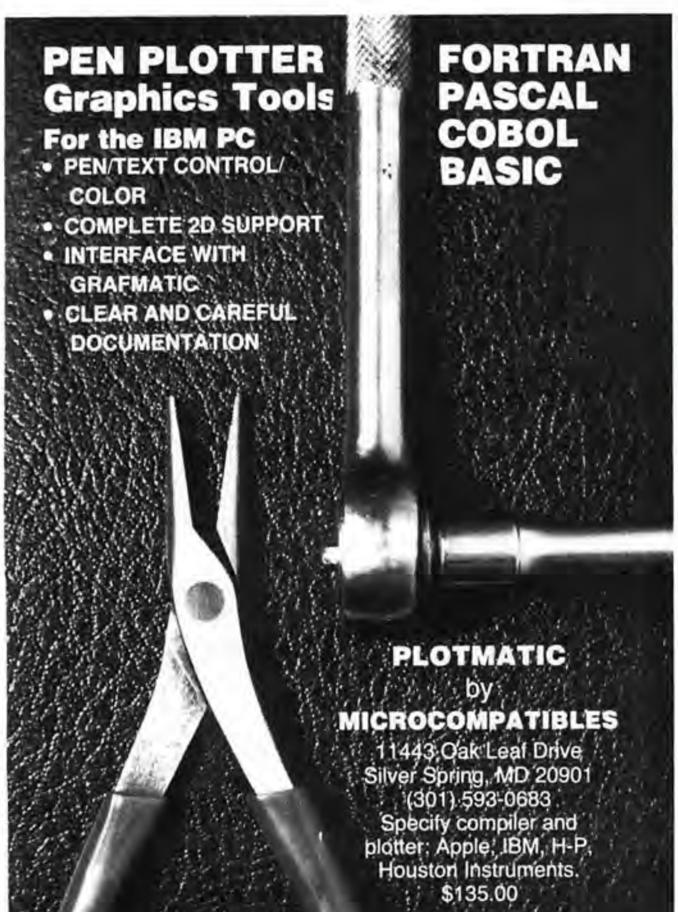
Please give us as much information as you can about the system you've developed your patch on. Tell us, for example, which version of which operating system you've used, as well as your hardware configuration; if you have information about compatibles on which your patch works or doesn't work, please include it.

He who send ASCII file on disk go to head of line. We'll return your disk.

Be succinct. We're interested in your programming endeavors, not in a microcomputer *War and Peace*. A little narrative prose, though, will not offend. Because of space limitations, we're more likely to print a short item than a long one.

Send your efforts to The Patch Patch, Softalk for the IBM PC, Box 7040, North Hollywood, CA 91605.





We're starting off this month with some modifications to *Scrnsave*, a phosphor-preservation utility written by John Socha (see December's *Softalk* for the original program). *Scrnsave*, you'll recall, made the PC's screen blank out after three minutes of inactivity. Reader Michael Shufenthal wondered in the February "Crosstalk" if Scrnsave could be modified so that the screen would go blank after some other interval. What follows is a variety of responses from readers.

From Peter Feldmann, Santa Barbara, CA

Since I've been interested in playing with assembly language, I keyed in the assembly source code provided by John Socha rather than using the BASIC program provided. Please note that the critical change for varying the length of time in the program is listed

TIMER_DELAY DW OCCCH

OCCC is the hexadecimal listing for the number of counts the CPU is supposed to wait before clearing the screen. OCCC in decimal notation is 3,276. Dividing that by 18.2 (the CPU counts 18.2 beats per second) yields 180, exactly the number of seconds in three minutes.

To change the waiting time, all you need to do is replace OCCCH with the desired number of seconds multiplied by 18.2. So, for

example, to make the screen go away after five minutes instead of three, multiply 5 * 60 * 18.2. That yields 5,460 decimal, which, converted to hexadecimal, is 1554.

Now, how do we get this into Scrnsave.com? The simplest way is to use the Debug.com file on your DOS disk. Work with a copy of Scrnsave.com, just in case you make mistakes. Load the copy into Debug by typing

DEBUG SCRNSAVE.COM

You should see the Debug prompt

-

Now, to place the new number in its proper position, type

E 10F

You should see CC. displayed—this is the lower, or less significant, part of the hex number OCCC. To make the time delay change to five minutes, enter the least significant part of hex 1554, which is 54. Then, press the space bar and you should see *OC*. This is

the higher, or more significant, part of the original hex OCCC number. To change this value, type *15*, which is the more significant part of hex 1554. Now press return.

To write the new number into the program, type the letter *W*. You will see the message

Writing nnn bytes

where *nnn* is the size of the program. Exit from Debug by entering the letter *Q*. I'd suggest renaming your five-minute version of *Scrnsave* to something like *Scrn5sav* in order to avoid confusion.

Any desired delay could be substituted for the five minutes in this example. The steps would be the same, but the number substituted at 10F would be different. Any value between 0001 and FFFFH could be inserted; the maximum delay time would be FFFFH (65535 decimal) divided by 18.2—which comes to about an hour. (Thanks also to Dr. M. Michael Shabot and Donald R. Bullard, who sent in similar patches.)

From Dave Roznar, Sunnyvale, CA

My wife found a bug while using *Scrnsave* with *Multiplan*; she uses the *paint* function a lot, as we have an RGB monitor. She found that the screen blanks out when she used *Scrnsave* with *Multiplan* but that certain colors cause the screen to blink nonstop when the image returns! I fixed the problem with a quick and dirty patch.

First, make a copy of the Scrnsave.com file using a different name, such as Mpsave.com. Then modify Mpsave.com using Debug, as follows.

Change 015C and 015D from 24F7 to 24D7

Change 0180 and 0181 from 0C08 to 2409

What you are doing is allowing only bit 0 and bit 3 (hex 9) to be set when you turn the video back on; the old instruction (OR 08) allowed anything. The 8 (bit 3) turned the video on and allowed even the blink bit (bit 5) to return. Bit 5 is also used to enable background intensity. This patch will never allow the 5 bit to return—so use this only in conjunction with *Multiplan*.

From Roger Host, Woodstock, IL

I have enclosed the necessary changes to the BASIC program that generates *Scrnsave* to produce a new, variable delay version. The changes are rather extensive and will require retyping about one-third of the data statements and some of the main program. When you call *Scrnsave* with no parameters on the command line, it will assume a delay of three minutes. If you do enter parameters, however, it will look for the first character. If it is a number from 1 to 9, it will use that as a delay in minutes. If the first character is not a number, the program tells you so and returns you to DOS without staying in memory; you then recall it with a valid parameter.

To modify the original *Scrnsave* BASIC program, make sure you have Scrnsave.bas in memory. Change the last number on line 1260 to an 83. Type in the new data lines starting with line 1270 and ending on line 1600. Type in the new data lines from 2000 to 2080. Finally, enter the new lines I have included with the data statements.

```
1270 data 111, 114, 114, 121, 44,  32,  121, 111
1280 data 117, 32,  101, 110, 116, 101, 114, 101
1290 data 100, 32,  97,  110, 32,  105, 110, 118
1300 data 97,  108, 105, 100, 32,  112, 97,  114
1310 data 97,  109, 101, 116, 101, 114, 44,  32
1320 data 97,  98,  111, 114, 116, 105, 110, 103
1330 data 32,  112, 114, 111, 103, 114, 97,  109
1340 data 46,  13,  10,  36,  73,  110, 115, 116
1350 data 97,  108, 108, 101, 100, 32,  102, 111
1360 data 114, 32,  97,  32,  100, 101, 108, 97
1370 data 121, 32,  111, 102, 32,  88,  32,  109
1380 data 105, 110, 117, 116, 101, 115, 46,  13
1390 data 10,  36,  187, 128, 0,   138, 15,  10
1400 data 201, 116, 55,  50,  237, 67,  138, 7
1410 data 60,  48,  114, 4,   60,  58,  114, 11
1420 data 226, 243, 180, 9,   186, 215, 1,   205
1430 data 33,  205, 32,  37,  15,  0,   116, 26
1440 data 139, 216, 12,  48,  162, 45,  2,   60
1450 data 49,  117, 5,   198, 6,   53,  2,   32
1460 data 184, 68,  4,   247, 227, 163, 15,  1
1470 data 235, 5,   198, 6,   45,  2,   51,  180
1480 data 9,   186, 20,  2,   205, 33,  184
1490 data 0,   0,   142, 216, 250, 161, 32,  0,   46
1500 data 163, 3,   1,   161, 34,  0,   46,  163
1510 data 5,   1,   199, 6,   32,  0,   21,  1
1520 data 140, 14,  34,  0,   161, 36,  0,   46
1530 data 163, 7,   1,   161, 38,  0,   46,  163
1540 data 9,   1,   199, 6,   36,  0,   155, 1
1550 data 140, 14,  38,  0,   161, 64,  0,   46
1560 data 163, 11,  1,   161, 66,  0,   46,  163
1570 data 13,  1,   199, 6,   64,  0,   198, 1
1580 data 140, 14,  66,  0,   161, 15,  1,   163
1590 data 17,  1,   251, 232, 197, 254, 186, 58
1600 data 2,   205, 39,  0,   0,   0,   0,   0

2000 data 223, 204, 206, 11,  167, 186, 154, 37
2010 data 114, 243, 233, 166, 250, 43,  45,  227
2020 data 50,  195, 90,  195, 207, 243, 120, 225
2030 data 166, 172, 212, 12,  88,  26,  67,  6
2040 data 10,  84,  45,  73,  31,  101, 51,  154
2050 data 155, 5,   13,  136, 222, 150, 65,  134
2060 data 241, 3,   175, 241, 11,  175, 119, 107
2070 data 199, 74,  204, 184, 232
2080 data 19,  89,  149, 45,  197, 21

10 DIM CHECK(61)
20 FOR I = 1 TO 61 : CHECK(I) = 0 : NEXT I
40 FOR I = 1 TO 61
130 RESTORE 2000 : FOR I = 1 TO 61
180 IF LINECHECK <> 197 THEN PRINT "Data bad in lines
2010- 2070." : END
230 FOR I = 1 TO 488
```

▲

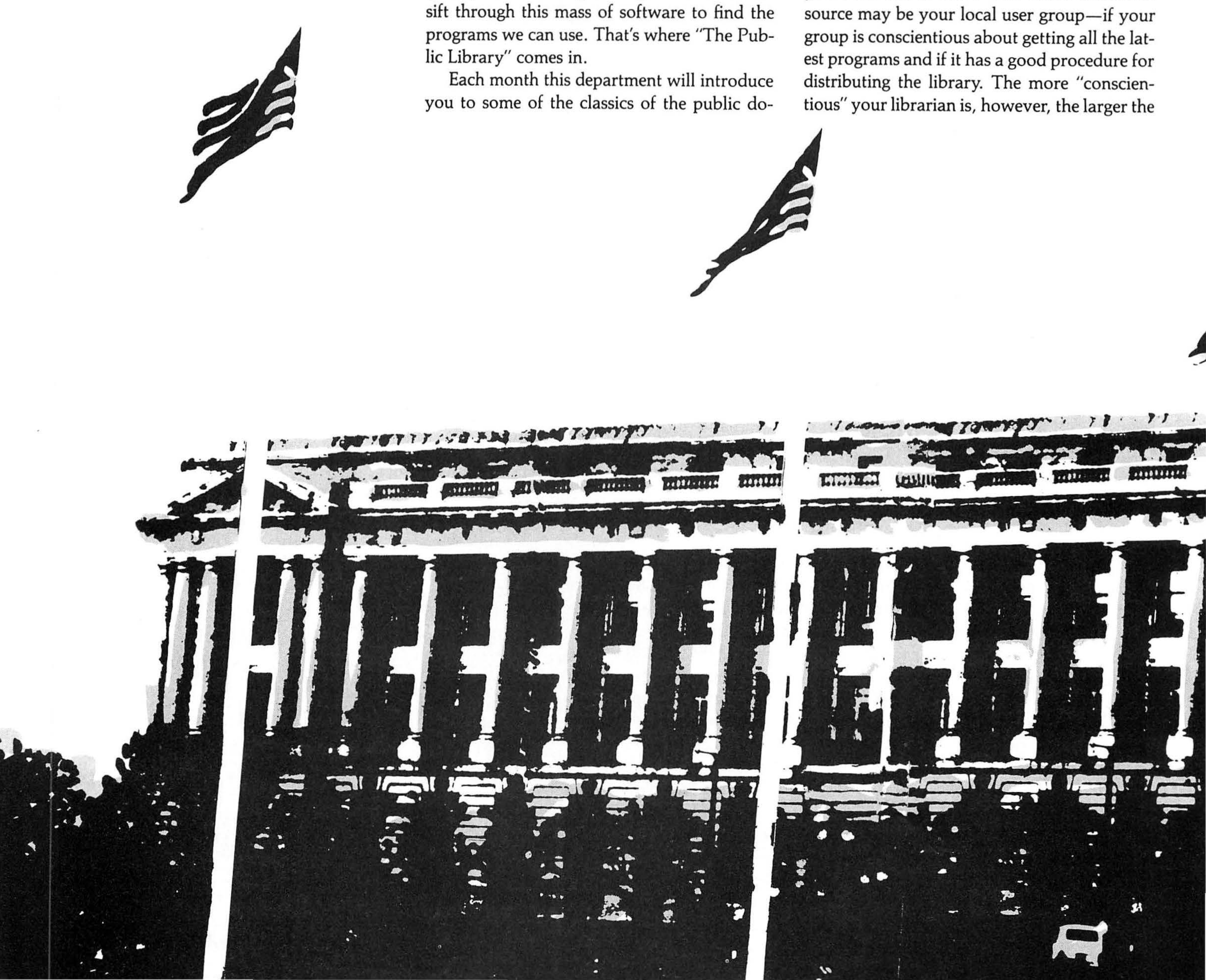
THE PUBLIC LIBRARY

A couple of years ago, a public-domain software library for the IBM PC usually consisted of a couple of floppy disks containing mostly games, and maybe a copy of *PC-Talk*. Now, there are thousands of public-domain programs available for the PC, with dozens more becoming available every month. Many of these are useful programs of professional quality. The challenge facing each of us is to sift through this mass of software to find the programs we can use. That's where "The Public Library" comes in.

Each month this department will introduce you to some of the classics of the public domain. Then, the best of the latest programs will be reviewed. But before we do any of that, we need to answer some basic (but frequently asked) questions:

WHERE CAN I GET THIS FREE SOFTWARE?

There are several ways to get the programs you read about here. The most accessible source may be your local user group—if your group is conscientious about getting all the latest programs and if it has a good procedure for distributing the library. The more "conscientious" your librarian is, however, the larger the

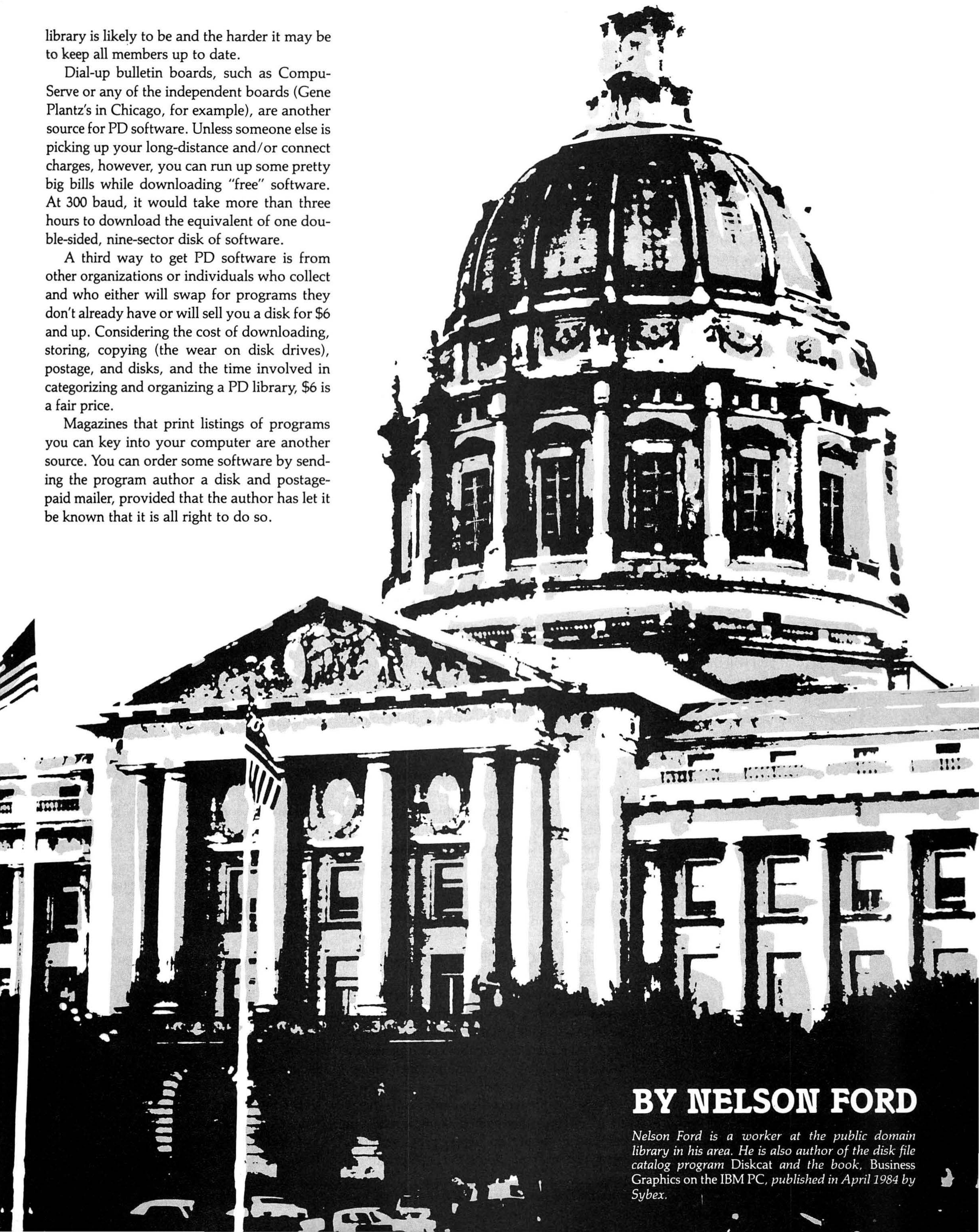


library is likely to be and the harder it may be to keep all members up to date.

Dial-up bulletin boards, such as CompuServe or any of the independent boards (Gene Plantz's in Chicago, for example), are another source for PD software. Unless someone else is picking up your long-distance and/or connect charges, however, you can run up some pretty big bills while downloading "free" software. At 300 baud, it would take more than three hours to download the equivalent of one double-sided, nine-sector disk of software.

A third way to get PD software is from other organizations or individuals who collect and who either will swap for programs they don't already have or will sell you a disk for $6 and up. Considering the cost of downloading, storing, copying (the wear on disk drives), postage, and disks, and the time involved in categorizing and organizing a PD library, $6 is a fair price.

Magazines that print listings of programs you can key into your computer are another source. You can order some software by sending the program author a disk and postage-paid mailer, provided that the author has let it be known that it is all right to do so.



BY NELSON FORD

Nelson Ford is a worker at the public domain library in his area. He is also author of the disk file catalog program Diskcat *and the book,* Business Graphics on the IBM PC, *published in April 1984 by Sybex.*

WHO WRITES THIS SOFTWARE?

The typical piece of PD software starts out as a program written for someone's personal use. Having written the program, the author may decide not to invest the additional energy that would be required to market it (marketing a program usually involves even more time, effort, and expense than writing one). So, instead of copyrighting it, the author allows the program to be copied; the program, consequently, becomes part of the public domain.

Some programs commonly thought of as public domain are only quasi-public domain. They are available from the usual PD sources, but, unlike other PD software, they are supported by their authors; the authors may fix bugs and add enhancements from time to time. Programs of this sort typically have required a much larger investment in programming time than has the average PD program, and they could possibly have been marketed through traditional channels had their authors wanted to go that route. Therefore, the authors request that if you try their programs and decide to use them, you send an amount of money suggested in the documentation.

The advantage to you of this quasi-public-domain approach is that you don't have to pay for fancy packaging (that you will throw in the trash) or for printed documentation. The documentation is simply a text file that you can read from DOS by means of the *type* command.

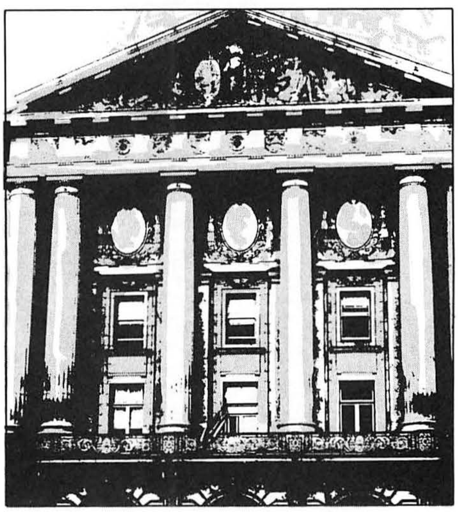
Andrew Fluegelman helped pioneer the quasi-PD software approach with his *PC-Talk*. Fluegelman came up with a catchy name for the concept: *freeware*. Unfortunately, he also registered the name as a trademark, so we're left without a catchy name for quasi-PD software. The name *freeware* isn't quite appropriate anyway, since the software isn't really free. You're supposed to send money if you use the program.

Contest: A free disk of software and widespread publicity for the person sending in the best name for quasi-PD, contribution-suggested software. Since Andy won't let anyone use *freeware*, we'll have to come up with another catchy name.

WHAT KIND OF PROGRAMS ARE AVAILABLE?

Short utilities for use in DOS or BASIC constitute the majority of PD software. For instance, *Sdir* is a program of fewer than 1300 bytes that can be used in place of the DOS command *dir*; *Sdir* gives you a directory listing in two or four columns sorted by name, size, or date. (Since PD programs are usually short, you may not be able to fill a disk with them; you may run out of directory entries before running out of disk space.)

Because of their nature and size, PD programs do not ordinarily compete with com-



mercial programs. For example, there is a PD full-screen text editor that can be used for creating a simple document; but this program can't come close to matching the features of *WordStar* or IBM's *Personal Editor* (nor was it meant to). It is nevertheless a good alternative to Edlin. Similarly, there's a PD spreadsheet program that poses no threat to Lotus but that's just fine for simple applications.

The PD library in my area currently includes more than thirty double-sided disks of utilities, mostly for use in DOS or BASIC. There are eleven disks of accounting/finance/business software, eight of miscellaneous applications, four of communications-related programs, three of programs related to word processing, and twelve of games.

HOW DO I KNOW HOW TO WORK THE PROGRAM?

Most PD software authors are pretty good about providing documentation; sometimes it's included in the program itself, but more often it resides in a text file that accompanies the program file. The most common filename extension for documentation files is "doc". So if you see one file named Example.com, for instance, and another named Example.doc, you can read all about the *Example* program by entering *type example.doc* at the DOS prompt. If you can't find a documentation file for a program, just grit your teeth and run the program. Chances are that it is self-documenting.

Filename Extensions. Files with extensions of "exe" or "com" contain programs that can be run from DOS (just enter the name of the program at the A> prompt). Files with the extension "bas" are BASIC programs; to run them you must first load BASIC, then type something like *run"example"*. The extension "asc", as in Examp2.asc, also indicates a BASIC program, but to run this kind of program you must type *run"examp2.asc"* after loading BASIC. If you leave off the *asc*, BASIC will add the default extension—bas—to the name and will say "File not found" when it fails to find Examp2.bas.

Files with extensions "asm", "obj", or "hex" are program source files that need to be translated by an assembler or compiler into working programs. The file Example.asm, for instance, is the source code for Example.exe or Example.com. Assembly language programmers are glad to get source code so that they can modify programs if they wish. But if all you want to do is run a program, you don't need the source code at all; you just need the com or exe file.

A file with the extension "bin" is usually meant to be *bloaded* into or linked with a BASIC program. Such a file contains the machine code for an assembler subroutine used by the BASIC program. If you encounter a file named Example.bin, you might also find one named Example.bas that loads and uses the bin file's data. If the bas file isn't there, you probably won't be able to do much with the bin file.

Here are some other common filename extensions:

"Bat"—a batch file containing commands to be executed by DOS or comments to be displayed. First *type* the batch file to see what it is going to do.

"Dat" or "dta"—a data file.

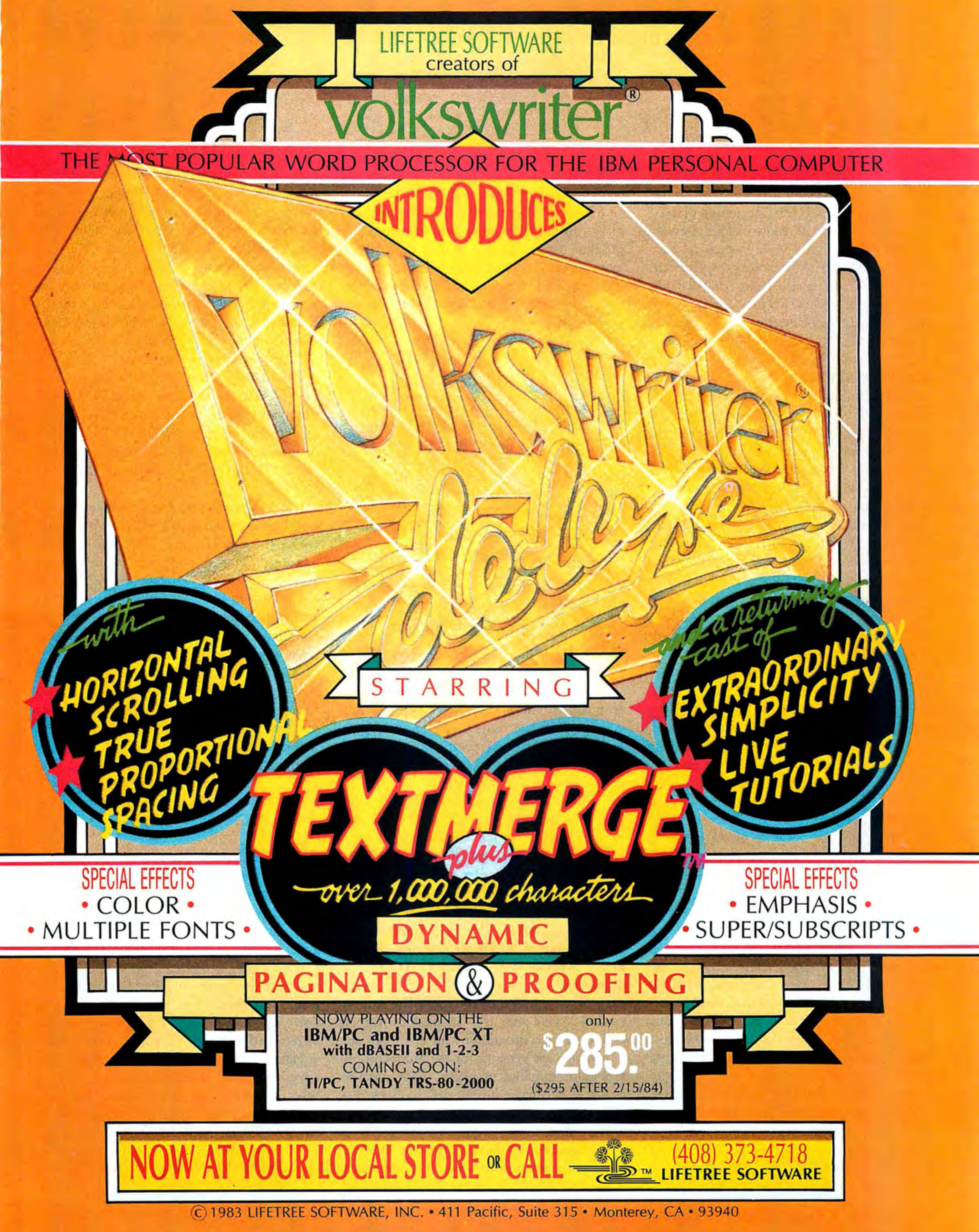
"Mod" or "pat"—modifications ("patches") for existing programs. These are usually text files that you can *type* from DOS.

"Pas"—a program written in Pascal.

"Pic"—Try using the *type* command on this file. If a recognizable picture doesn't scroll across your screen, the file is probably a data file for a graphics program.

"Txt"—Like doc files, files with this extension contain text and can probably be read from DOS with the *type* command.

"Wks" or "prn"—Files with extension "wks" are models created in Lotus *1-2-3*; you



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have to load them back into *1-2-3* to use them. Files with the extension "prn" are *1-2-3* "print" files; these are ASCII text file images of *1-2-3* worksheets and can be read with the *type* command or loaded into a word processor.

A file with an extension other than the ones just listed is probably either a text or a data file. *Type* such a file from DOS to find out which it is if you cannot find a doc file of the same name to tell you.

PD'S GREATEST HITS

To get the ball rolling, here are some utilities you can use many times a day to make running your PC easier and more convenient. Please be aware that only you can determine the suitability of these programs for your system. Neither *Softalk* nor I warrants any of these programs in any way.

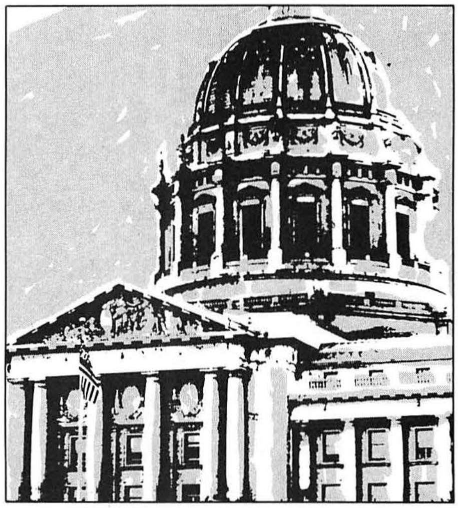
***SD* or *Sdir* or *Cat*: A sorted directory utility.** This was mentioned earlier as a utility that displays a sorted directory, showing file sizes, creation times and dates, and the amount of free space on the disk. The program allows you to sort the directory by filename, date, size, or extension. It was originally written for DOS 1 and was later modified to work with DOS 2 subdirectories. One version of this program displays the directory in two columns. Another uses four columns, saving space by rounding file size to the nearest thousand. Look for a version that displays file attribute and automatically pauses if the directory listing is too large to fit on a single screen.

Can anyone tell me for certain who the originator of this program is? I would like to give the author the credit he or she so richly deserves. The leading candidate at this point is John Chapman, although I seem to recall seeing some anonymous versions prior to his. One problem with trying to give credit is that sometimes different people will write the same type of program at more or less the same time.

Scrollk—A program that activates the scroll lock key. Instead of scrambling to hit control-num lock to prevent data from scrolling off the screen, you can use the scroll lock key. The left shift key will then cause the display to advance twenty-four lines and pause again. The right shift key will cause the display to advance one line at a time. Pressing the scroll lock key a second time toggles *Scrollk* off.

This program was written by John Socha and first appeared in the May 1983 *Softalk*. It does not appear to work with DOS 2 commands if a Config.sys file that contains the command *device = ansi.sys* is present.

***Monblank/Scrnsave*—A program that blanks the monitor after five minutes.** This program was originally written to save the monochrome monitor from having a permanent *VisiCalc* template etched into its screen by the carelessness of a user who walked off and



left the system on. There have been reports of people who burned out their monitors with some versions of this program, so be sure you get a copy from someone who's already using it on a system like yours. I've been using both the monochrome and color versions of the program for months with no ill effects. The first version I saw was *Monblank.com*, written by Richard Winkel. Another version by John Socha was published in the December 1983 issue of *Softalk* under the name *Scrnsave*.

***Monoclk/Cgclock*—A program that displays a clock in the corner of the screen.** This should not be confused with some clock programs that simply display a large clock in the middle of the screen. This clock program displays the time in the corner and runs concurrently with other programs. The clock disappears when you are in BASIC but reappears when you return to DOS. The earliest version I have seen was adapted by Daniel O'Brien from a program by an unknown author. There are versions for the monochrome and color graphics monitors, with patches available to change the color of the clock display, to change the location on the screen, and to allow an alarm to be set.

***Comspec4*—A program that tells DOS to look for Command.com on a drive other than A.** Not all of DOS is loaded into a protected area of memory. If you run a program that overwrites the unprotected area, DOS normally goes to drive A when it needs to reload its transient portion. If it doesn't find Command.com on the disk in drive A, DOS tells you to mount the correct disk in drive A; it will not look on other drives. This program lets you use a RAM disk or a hard disk as the default drive, so you won't have to keep Command.com on a floppy in drive A.

Comspec4, originally written by Ted Reuss and modified by Daniel O'Brien, works only with DOS 2. If you are still using DOS 1, you can avail yourself of patches that will protect all of DOS in memory, so that DOS never has to look anywhere for Command.com. Hunt for a PD file named something like *Cmdres.mod.*

***Flip*—A program that sets the num lock and caps lock keys and switches display output between the monochrome and color/graphics adapters.** This is handy to have in your Autoexec.bat file if you like to have your machine come up with caps lock and/or num lock set in a particular way. It's also useful for systems that have both display adapters. The program was written by Thomas Foth.

***UNWS*—A program that converts a *WordStar* document-mode files to nondocument format.** Files created in *WordStar*'s document mode are filled with funny-looking characters that make the file hard to read from DOS and harder still to transmit over the phone. This utility, written by Gene Plantz (of the bulletin board of the same name) converts such files to straight ASCII.

WHAT'S YOUR FAVORITE?

All of the above PD programs were mentioned here because they're utilities that are likely to be used every day. There are many programs that don't get used every day that are still great. I'll mention them in future columns. If you have some favorites, drop me a line. Or if you've written a program you think the world would be interested in, send me a copy on a disk. Any disk of PD software sent to me will be returned with new PD software on it. Individuals or groups who swap or sell PD software are invited to send descriptions of their collections, how they're organized, and how readers may obtain disks from them, and so on. Send letters and disks to

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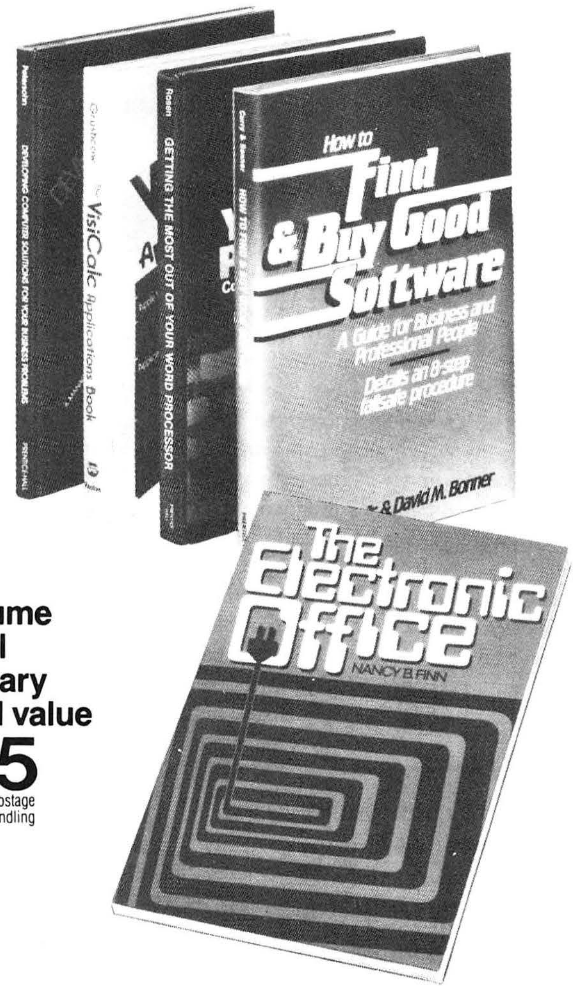

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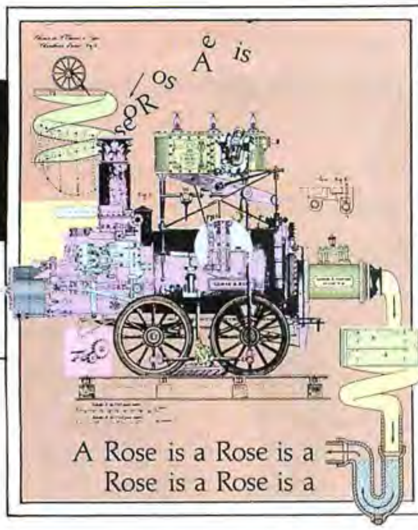

by Terry Tinsley Datz and F. Lloyd Datz

When the people at Bank Street College of Education went looking for a word processor friendly enough to help children learn to write, they came up empty-handed. Not inclined to give up easily, they started from scratch and designed their own program called, naturally enough, *Bank Street Writer.*

The original Apple version of *Bank Street* has a devoted following that includes plenty of big kids as well as little ones. Now, a brand-new beefed-up version is ready to show the PC and PC*jr* crowd what it's been missing.

Overall Design. So what is it that sets *Bank Street Writer* apart from all those other word processors that call themselves easy to learn? For one thing, there's nothing to memorize; you can find out everything you need to know about the program right on the screen. For another, it's tough to make a dumb mistake. *Bank Street* coaches you every step of the way, keeping an eye out for potential disasters and cheerfully giving you a second chance when you take a wrong turn.

Bank Street has separate writing and command modes. You use writing mode to enter text and to take care of typos with the backspace and delete keys. When you want to make more extensive changes or do some housekeeping, you go to command mode (by hitting the escape key). Here the main menu gives you twelve different options, including *save, retrieve, erase, unerase, move, moveback, copy, replace, print, format, clear,* and *other.* Moving the tab key highlights the option you want; pressing the return key selects it. *Bank Street* guides you through the function you've selected, and when you're ready to go back to writing, you hit the escape key again.

True, *Bank Street* does have a few commands that don't appear on the menu, but each of these commands is represented by a mnemonic consisting of the alt key plus one letter. For example, the underlining command is alt-U, and the boldfacing command is alt-B. There's no need to memorize such commands, however, since you can bring up a summary of key assignments by hitting alt-K (K stands for keys).

Text Entry and Editing. *Bank Street* starts out ready for writing. In this mode, the top four lines of the screen remind you which keys to press for essential operations such as moving the cursor, erasing typos, and switching to command mode. At the bottom of the screen are more reminders; one tells you which disk drive is active, another flashes a message when you engage the caps lock or num lock key. When you switch to command mode, the top four lines of the screen display the main menu's twelve options. As you move the cursor through this menu, *Bank Street* gives you instructions for carrying out the command it's highlighted.

To keep text entry simple, *Bank Street* is always in insert mode; it has no overtype mode, the villain of many a lost word on other word processors. If you go back and insert something in the middle of your text, the existing text slides ahead one line to give you breathing room. When you fill all eighteen lines of the screen, your text scrolls halfway up the screen, leaving the bottom half of the text-entry area free. This is a nice compromise between yanking all but two lines of text off the screen or forcing you to stare at the bottom of the screen while you type.

Unlike its Apple cousin, the PC rendition of *Bank Street* allows you to move the cursor without leaving writing mode. There's nothing fancy about these moves, though. The arrow keys perform as you'd expect, as do the page-up and page-down keys, which scroll by screenful. You can also jump to the beginning or end of a line by hitting the control key along with either the left- or right-arrow key.

The backspace and delete keys also perform predictably: The delete key erases the character under the cursor, the backspace key deletes to the left. Although *Bank Street* does an admirable job of reforming paragraphs when you make insertions, it's a little less obliging with deletions. It waits until you delete an entire line before it tightens things up; if you delete a partial line, you have to close up the gap yourself by erasing the extra spaces.

For larger deletions (up to fifteen lines), you hit the escape key to get into command mode, then use the tab key to move the highlighter to the *erase* option. Once you've chosen to erase, *Bank Street* takes charge and tells you what to do in no uncertain terms. "Put the cursor at the *beginning* of the text you want erased and press return," it prompts, followed by, "Move the cursor to the *end* of the text to be erased and press return." As you move the cursor, *Bank Street* highlights your text in inverse video. Should you try to get tricky and mark

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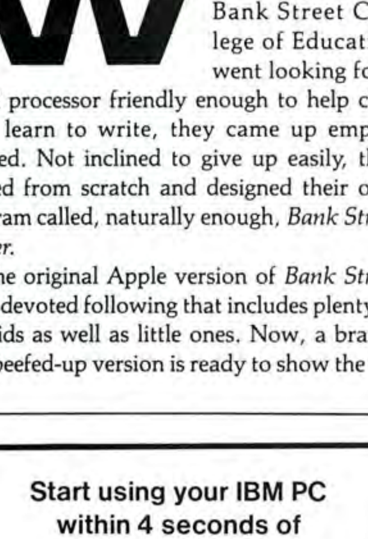

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the tail end of the segment first, you get a polite message insisting that you do things in the proper order. After you hit return to signal that everything is marked to your liking, *Bank Street* asks, "Are you *sure* you want to erase the highlighted text?" Even if you give the go-ahead and then change your mind, you can reclaim your deleted words with the *unerase* command. Only when you switch back to writing mode does your deletion become unretrievable.

Moving and copying a block of text works much like deleting, except that you choose *move* or *copy* from the main menu. Both commands let you preview your text in the new location before you give the final go-ahead. There's also a *moveback* command that gives you still another chance to undo your move, provided you haven't gone back to the writing mode. Even *Bank Street*, however, has its limits—it has no *uncopy* command.

With the *replace* command you can locate words or phrases up to seventy characters long. Here again, you get plenty of prompting. After you type in the phrase you want to find or replace, *Bank Street* superimposes a window over your text and asks you questions about how you want the searching and/or replacing done. You can have capitalization ignored or matched letter for letter, and you can search for whole words or partial matches. If you're replacing one word with another, you do it automatically for all occurrences or you can confirm each replacement individually.

Bank Street is unusual in that it doesn't define the special function keys—it leaves that job up to you. For example, if you don't like typing alt-key combinations, you might want to assign two of the function keys to the task of underlining and boldfacing. Or, you can set up macros that insert frequently used phrases into your text. You have to keep your phrases simple, though, since you can't assign more than forty-five characters to any one key. And you'll have to keep notes, because there's no on-screen reminder of what you've assigned to each key.

A utility program makes defining the function keys a snap. You just type the text or commands you want assigned to each function key in the space provided. *Bank Street* then asks whether you want your key assignments saved on disk, in which case they'll automatically be loaded into memory every time you boot the program disk. The bad news is that you have to leave the main program to use the utility.

Formatting and Printing. In the interest of simplicity, *Bank Street* shies away from fancy formatting options, but it does offer more than enough features for its intended audience. However, among the things you can't do is print fully justified or flush-right text.

Also in the interest of simplicity, *Bank Street* has you do all your formatting from just one menu, which you call by choosing the *format* command from the main menu. Teachers who need to set up several program disks at once should especially appreciate the convenience of this one-step approach. Once the settings have been adjusted for the application of the day—say, poetry—there's no need for anyone to fuss with them.

As you move the highlighter through the format menu, the program gives you the permissible range of values for each option as well as the standard setting for that option. It tells you, for example, that line length can be anywhere from 40 to 125 columns and that the standard setting is 65. Other adjustable settings include line spacing, lines per page, and margins. When you exit from the format menu, you indicate whether you want your new settings stored on disk for future use.

Bank Street doesn't format while you edit, so the settings you choose from the format menu have no effect on the text you see on-screen; you can preview your text's format only by "printing" your file to the display. You can, however, adjust the on-screen text width to anything between forty and eighty columns, but this is independent of the line length of your printed text.

Bank Street is surprisingly flexible about page numbers. You can print them at the top or bottom of the page, either centered or aligned against the left or right margin. You can even alternate them book style between the left and right margin on odd and even pages. *Bank Street* is less accommodating with headers and footers. It limits their length to thirty characters, and, although you can print them flush left, centered, or flush right, you can't alternate their positions as you can page numbers.

As you'd expect, setting tabs (either regular typewriter tabs or decimal tabs) is easy: You choose the *format* command, then select the *set tabs* option from a submenu; this summons a ruler to the bottom of the screen. To set or change tab stops, you move the cursor along the ruler and hit *T* for regular tabs or *D* for decimal tabs, or press the space bar to clear existing tabs.

Although you can't vary margin settings within your file, you can have entire paragraphs automatically indented from the left margin—or from both margins, for that matter—by embedding alt-key commands. These commands only work in multiples of eight spaces, however, so you're out of luck if you want to indent, say, five spaces.

With other alt-key commands you can center a line of text (alt-C) and force a new page (alt-P), although you can't see the effect of either command on the screen until print time.

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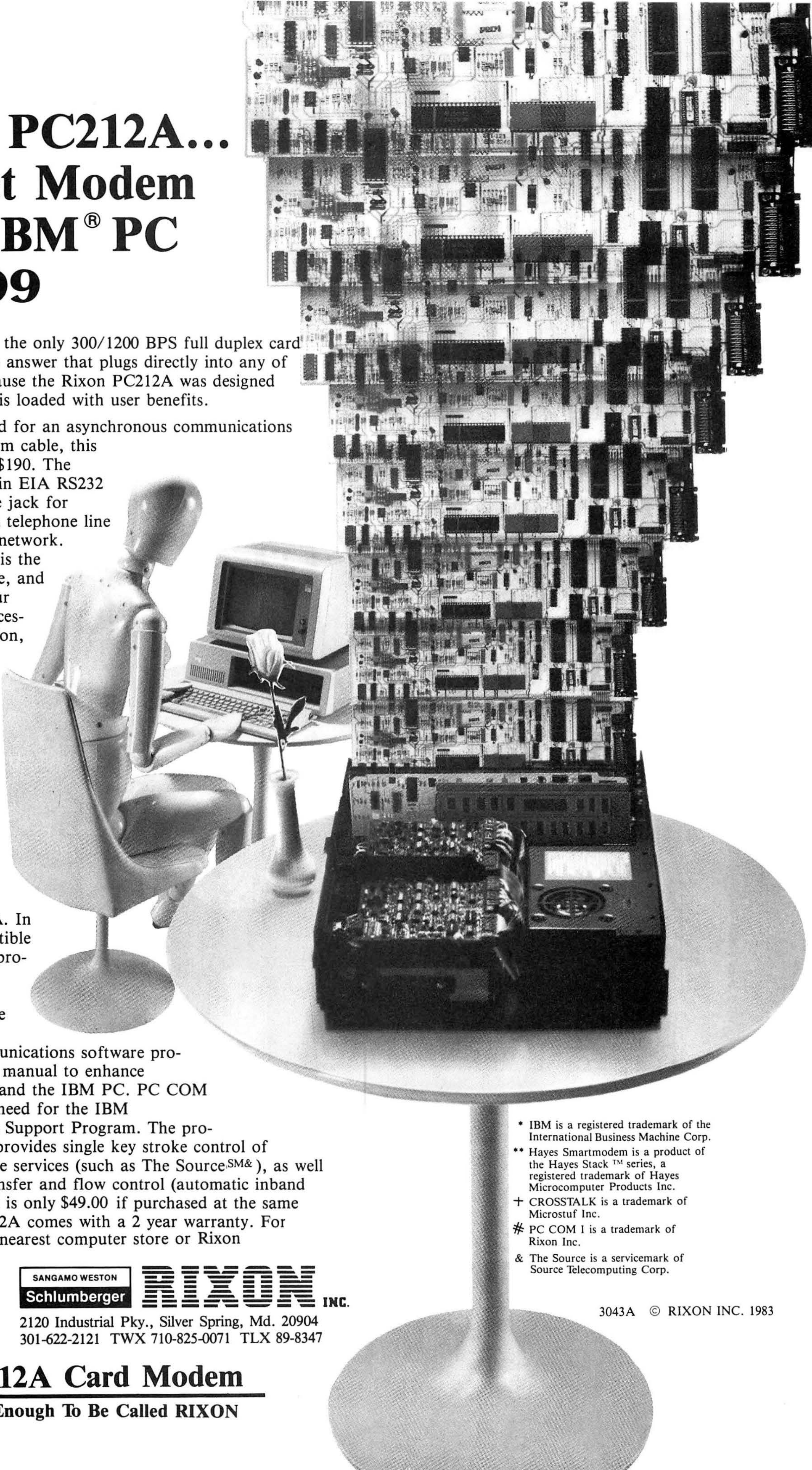

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Bank Street provides direct support of only two special printing features, underlining and boldface, both of which are paired alt-key commands (alt-U to underline and alt-B to boldface). Although it does a nice job of displaying these enhancements on-screen, it also inserts some visible markers; the words Bold and Under appear in inverse video before and after text you want to print in boldface or underlined. Although they clutter up the screen, such markers do make it easy to find and delete the embedded commands should you decide you don't want them.

Because paired commands are potential troublemakers, *Bank Street* makes sure that each alt-B and alt-U has a partner. If you forget to insert the second, closing command, the program automatically deletes the opening command when you finish the paragraph—but not before beeping and flashing a warning message.

If you want more exotic printing effects than boldfacing and underlining (italics, superscripts, subscripts, and the like), you'll have to consult your printer's manual and supply the appropriate commands yourself. Because printer manuals seldom win acclaim for clarity, the *Bank Street* manual thoughtfully provides a few pointers on deciphering printer jargon.

For all its simplicity, *Bank Street* doesn't skimp on printing options. You can do a partial print as opposed to printing an entire file, and you can print several copies of the same file. An option that's handy for chaining several files together prevents the last page of your file from being ejected from the printer. This means you can begin printing the next file at the page and line number where the previous file ended. When you're ready to print your work, *Bank Street* asks a series of questions, each of which is already set to the standard answer. If you want to go with the default setting, you just hit return.

Like most other word processors that don't format your text on-screen, *Bank Street* allows you to get an idea of your document's final appearance by sending output to the screen instead of to your printer. Unless you've selected a line length greater than eighty columns (in which case you'll see only the first eighty columns on-screen), your text will look identical to the printed version—minus the page breaks, that is. Luckily another of *Bank Street*'s printing options takes care of that problem. After dividing the screen into two windows, *Bank Street* starts with the first page break and displays the last eight lines of page 1 in the top window and the first eight lines of page 2 in the bottom window. By tapping the up- or down-arrow keys, you can adjust the break in either direction, either squeezing a few more lines onto page 1 or bumping a couple of lines down to page 2. When you have the break exactly where you want it, you hit the return key. *Bank Street* goes on to show you the bottom of page 2 and top of page 3, and so on.

File Handling. Because *Bank Street* is designed to operate smoothly with just one disk drive (as on the PC*jr*, for example), it loads completely into RAM, freeing the disk drive for your data disk. This arrangement is incompatible with automatic disk buffering, so file size is restricted to whatever will fit into your system's memory. With 64K (the program's minimum RAM requirement), you can edit files of up to ten double-spaced pages. With 128K, as on an unmodified PC*jr*, you get a little more file capacity—up to about eighteen pages.

Always on guard for potential disasters, *Bank Street* is especially alert when it comes to commands that shuffle your files to and from disk. Its prompts and instructions leave no room for confusion. When you choose the *save* command, for example, you're asked whether you want to save your whole document or only part of it and whether you need to see a catalog of the files on the disk. It's hard to go wrong with messages such as "Room on

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disk for additional files containing 31,061 words" and "Type the name to give this file on disk." The latter prompt is followed by eight blank spaces; if you try to type more than eight characters (or an illegal character), *Bank Street* makes the computer beep and refuses to accept the filename.

You can even give your file a three-character password (the DOS three-character extension), which is a nice security option for situations where several people share the same disk. Even though passwords are invisible when you call the file directory (files with passwords are marked by an asterisk), there's no danger of ending up with a permanently locked file; if you forget the magic letters, there's a utility that lets you peek at them.

Other *Bank Street* utilities allow you to copy, erase, or rename a file; copy an entire disk; print the directory of files on a disk; format a data disk; and print a batch of files without supervision (if you have a printer you can leave unsupervised, that is). The last option is a lifesaver for teachers who have to beg or borrow a printer at the end of the day.

Documentation and Support. Like the program itself, the *Bank Street* manual gets the job done with little excess baggage. A trim fifty-four pages, it explains each command simply. However, it's probably the least-read manual in existence, because this is one program you really *can* learn without cracking the manual.

For those who like their learning structured, the program disk comes with a seven-lesson tutorial that covers most of *Bank Street*'s basics. The tutorial is an exacting taskmaster, however, so you should expect to get your hands slapped for not following instructions to the letter—if you so much as insert an extra space, you'll hear about it.

Bank Street Writer is copy-protected. It comes in both home and school versions. The home version, distributed by Broderbund Software, comes with an extra disk for backup; the school version, from Scholastic, Inc., includes three copies of the program plus a set of writing exercises and guides for both student and teacher. *Bank Street* is one of the few word processors whose licensing agreements don't limit their use to individual machines.

Ease of Learning and Use. The people at *Bank Street* know kids, and they've spent a lot of time figuring out what confuses them. Most word processing manuals, for example, think nothing of telling you to "press the right-arrow key." But, as *Bank Street*'s pint-sized testers pointed out, the PC's keyboard has no fewer than ten arrows on it, and two of them point to the right. For this reason, *Bank Street* has a help screen that diagrams the keyboard, leaving little doubt as to what each key does. Similarly, every place in the program where kids (and adults) tend to make mistakes, not-so-

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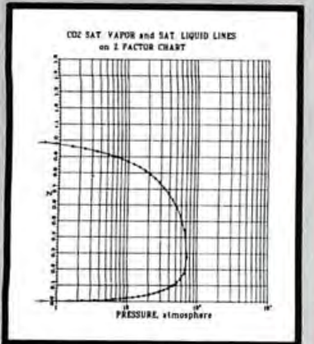

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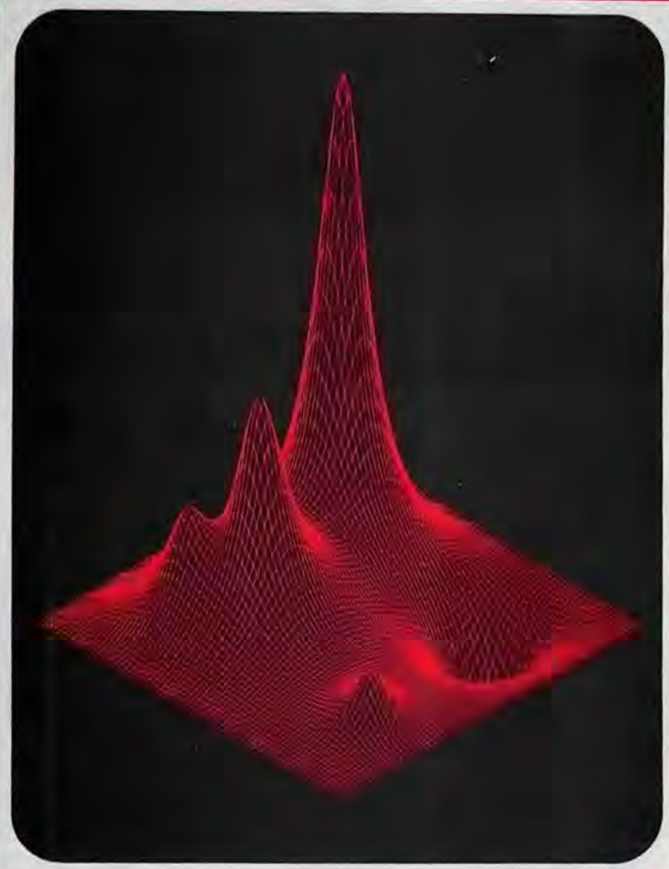

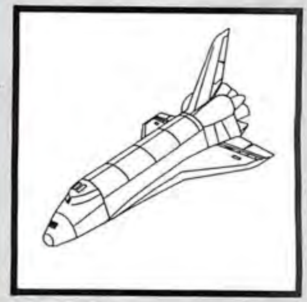

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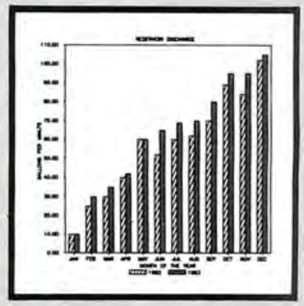

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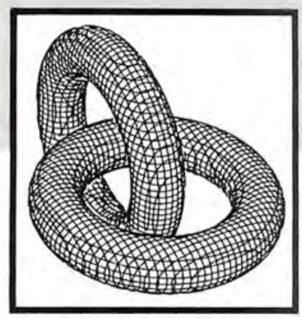

Program Output

Contouring

PLOTCALL is a graphics system that processes standard plotter instructions into a form that can be printed on over 20 dot matrix printers. This is not another print screen program; presentation quality graphics are created directly on the printer to achieve the maximum resolution possible. (120 x 216 dots per inch for Epson printers)

PLOTCALL includes 17 symbol sets for sign making and plot labeling. Symbol sets may be altered, or create your own! Character strings may be created from any symbol set, rotated to any angle, and scaled to any size.

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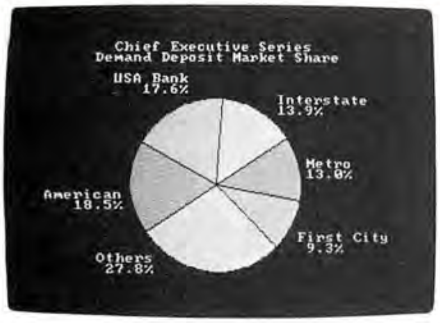

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subtle reminders ask them if they're *sure* they want to go ahead.

Whether or not you think *Bank Street* is efficient to use once you've learned it depends on what you're using it for. The fact that you can't override any of the menus or prompts is not likely to be appreciated by anyone who's in a hurry. On the other hand, because you don't have to use it every day to keep from getting rusty, *Bank Street* is perfect for people who don't make word processing their vocation.

In the Works. For an encore, the people at Bank Street are bringing out a spelling checker called, naturally, *Bank Street Speller.* They promise that it will carry on the Bank Street tradition of easy learning.

Summary. Don't make the mistake of thinking that *Bank Street Writer* is just for kids. This is a program the whole family can enjoy. After all, the family that processes words together....

System Requirements. *Bank Street* is designed to work with minimal hardware. It runs on the PC, the PC*jr* (you'll need an eighty-column display), the Compaq, and most other PC compatibles with as little as 64K of RAM and one disk drive. It's not intended to work with a hard disk. Although the program disk doesn't come with any printer setup files, the print menu allows you to enter parameters for a serial printer as well as backspacing and linefeed data for special printing features.

The Speller

Another star performer in terms of ease of learning and value per dollar is *The Speller,* a standalone spelling checker from Hayden Software. *The Speller* comes with configuration files for *WordStar, Volkswriter, The Final Word, EasyWriter 1.1,* and, of course, Hayden's own *PIE Writer.* You can also modify it to work with other word processors whose files bear at least a remote resemblance to standard DOS ASCII files.

Installing *The Speller* is as simple as telling it which word processor you're going to use. If your files are of the *WordStar* variety, for example, it knows to clear all high-order bit flags and to ignore lines beginning with periods. If you have a word processor for which *The Speller* doesn't have a configuration file, you choose the *other* option, then fill in information about embedded commands, linefeeds, and the like. *PIE Writer* users have the advantage of being able to copy *The Speller* to their word processing disk and initiating a spell check from *PIE Writer*'s main menu or editor.

How It Works. To get started, all you do is supply the name of the file you want proofread. If you can't remember your file's name, you can call a directory. Unlike most other spelling checkers, *The Speller* doesn't dive headlong into its main dictionary when you ask it to proofread your file. Instead, it starts with a minidictionary of twelve hundred very common words that it stores in RAM for quick access. After compiling a list of words not found there, it consults its main dictionary, which includes upward of twenty thousand words. Finally, armed with the list of words still not matched, it checks the auxiliary dictionary that you've built (appropriately called the Mywords dictionary) and comes up with a final list of suspect words along with the total word count for your file.

With the checking complete, *The Speller* swats the ball into your court and displays its main menu, which gives you seven options (*display, print, check, scan, use, review,* and *exit*) as well as short explanations of each.

The *display* option provides you with a quick summary of either suspect (unmatched) or valid (matched) words. By previewing the list of suspect words, you can get an idea of what the problem is: Are the flagged words false alarms or are they the same old troublemakers that you never seem to spell correctly? After you've gone through your file and made your corrections, you can use the *display* option again, this time to get a list of all the words you've corrected in that file.

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The *print* option provides the same summary lists as *display,* but in hard-copy form. Since *The Speller* doesn't have a look-up feature to help you find correct spellings, you might want to get a printout of suspect words before digging out your own dictionary—especially if you've got a fairly substantial list of words to look up.

You choose either *check* or *scan* when you're ready to review suspect words one by one. If you choose *check, The Speller* shows you each word individually with no surrounding text. A menu gives you four choices: You can accept the word as valid; accept the word as valid *and* add it to the Mywords dictionary; replace the word with the correct spelling; or postpone your decision until later. If you choose to correct the word, *The Speller* prompts you to type in the correct spelling. Should you decide to postpone your decision, *The Speller* continues to show you other occurrences of the word until you decide whether to accept or correct it.

The *scan* option works just like *check* except that it shows you each word in context, twenty-two lines of context to be exact. As *The Speller* scrolls through your file, it stops to highlight each suspect word, giving you the same four options as with *check.* If you correct the word, *The Speller* quickly changes it in your text before it moves on to the next suspect word.

Once you've made one pass through your file, *The Speller* returns you to the main menu where you can choose *scan* again. This time the program stops and highlights each word you corrected so you can see if everything went as you intended. Of course, if you're working with fully justified text or if any of your corrections significantly change the length of a line, you'll still have to go back to your word processor to reform the affected paragraphs.

You select the *use* option from the main menu when you want *The Speller* to check your file against auxiliary dictionaries other than Mywords. You can build as many of your own dictionaries as you need for your line of work. For example, you might want to have one dictionary for proper nouns, one for technical terms, and so on. Depending on what kind of manuscript you're proofreading, you can decide which dictionary you want *The Speller* to check. The only limit to the number of words you can place in such a dictionary is the amount of disk space you have. If you want to merge several smaller dictionaries into one giant list, you can use the concatenation feature of the DOS *copy* command.

As a last step in the proofing process, you can choose the *review* option to review your decision on each suspect word. *The Speller* shows you each word that it flagged along with your decision on that word. For example, if you had misspelled *occasion* as *ocassion* and replaced it with the correct spelling, you might see:

ocassion —〉 occasion
Replace word Yes (Y) or No (N)?

If you type *Y,* your correction stands; if you type *N, The Speller* once again displays your original four choices and lets you try again. Or, if you've accidentally added a misspelled word to the dictionary, the *review* option provides a painless way to retrieve it.

The final option on the main menu is *exit,* which takes care of writing the updated version of your file to disk and adding new words to the dictionary of your choice. If there are any suspect words in your file that you've postponed action on, *The Speller* asks you to confirm your intention to exit. Next, it asks you in what dictionary you want to store your list of marked words—the Mywords dictionary, which *The Speller* uses during each proofing session, or a second auxiliary dictionary, which it uses only on request. Finally, if you've made corrections, *The Speller* asks whether you want to save the corrected version of your file to disk. If so, it preserves the original file by adding the .bak suffix to its filename. If there's already a version of your file on disk with the .bak extension, *The Speller* asks your permission to erase it.

Documentation and Support. Although only thirty pages long, *The Speller's* manual covers all the bases. Step-by-step instructions guide you through copying the master disk, putting a copy of DOS on your working disk, and customizing the working copy for your word processor. The manual also includes a reference section, a set of sample screens for a typical spelling session, a flow chart of commands, and both an index and table of contents.

The Speller isn't copy-protected. Hayden maintains a toll-free line for questions and problems.

Ease of Learning and Use. Like *Bank Street Writer, The Speller* gives you enough on-screen help to keep you out of the manual and out of trouble. Just follow the menus and prompts and you've got it made. If you make a choice and then change your mind, you can back up to the main menu by hitting control-break.

On the negative side, *The Speller* doesn't suggest correct spellings for suspect words, which means you may spend a fair amount of time flipping through a print dictionary. And, although *The Speller's* small dictionary (twenty thousand words) saves it from wasting time checking your file against rarely used words such as "aardvark," it guarantees that you'll encounter a lot of suspect words until you build up the Mywords dictionary.

Summary. If you've resisted buying a spelling checker because you consider them more trouble than they're worth or because you don't want to invest your life savings, Hayden's speller may be just what you're waiting for.

System Requirements. *The Speller* runs on the PC, PC*jr*, Compaq, Corona, Eagle PC, and the Hyperion, with one disk drive and as little as 64K of RAM. ▲

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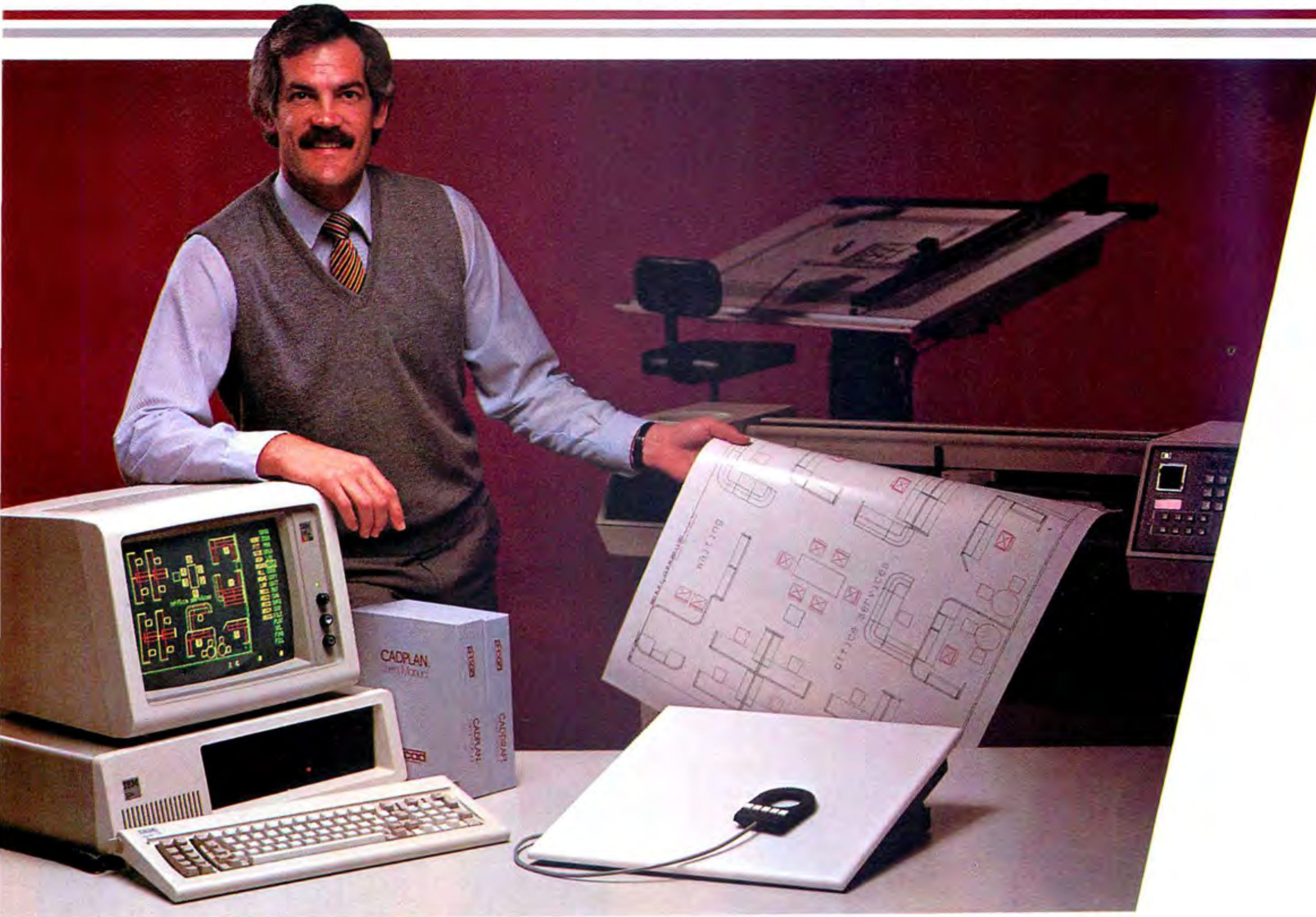

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160 DEF SEG = &HF00 ' Use def seg = &H1700 for machines
170 LOCATE 3,1,0 : COLOR 18 : PRINT "Reading DATA
180 FOR MEM% = 0 TO 647
190 READ DT%
200 IF CHECKCNT% = 0 THEN GOSUB 290 : READ DT%
210 IF DT% (0 THEN CHECKSUM% = DT% : GOSUB 360
220 POKE MEM%,DT%
230 CHECKSUM% = CHECKSUM% + DT%
240 CHECKCNT% = CHECKCNT% + 1
250 GOTO 460
260 '
270 ' ' THIS PERFORMS CHECKSUM BY LINE
280 '
290 IF CHECKSUM% () DT% THEN 490

DUMP THAT FILE

BY HOWARD GLOSSER

During the past few months in the BASIC/Assembly line, we've dealt with subroutines that make life easier for the user rather than the programmer. This month we're going to change that and give you programmers a utility to display on-screen any file—including hidden and system files—in either ASCII or hexadecimal format.

Although this utility is written in assembly language, you don't need to know assembly language or own the *Macro Assembler* to use it. The code is embedded in the data statements of a BASIC program. All you have to do is type in, save, and run the BASIC program. The utility, called Filedump, will then be stored on disk, ready to help you explore your files.

The Essential Part. The first step in creating the subroutine Filedump is to enter the BASIC program shown in figure 1. Don't let all those data statements discourage you; you enter them only once.

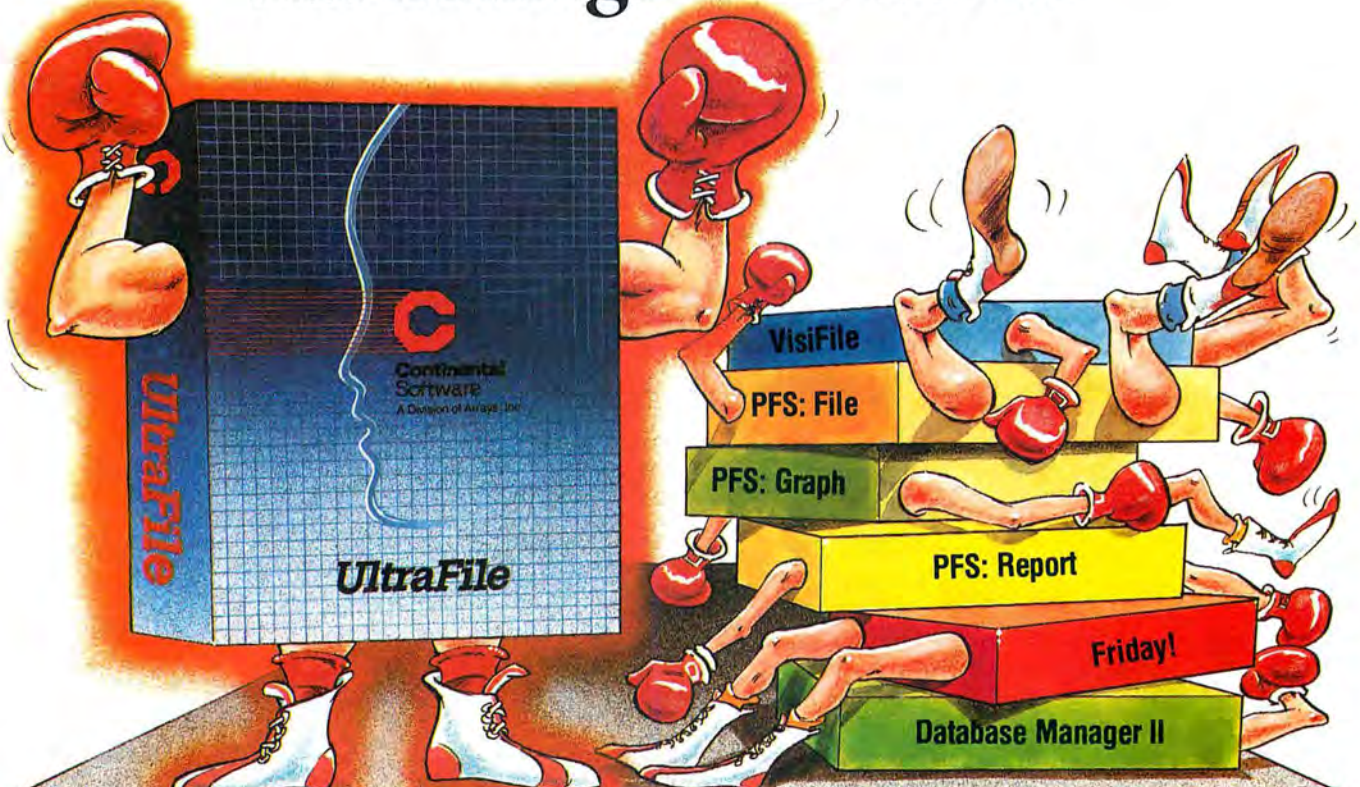
Since this is a long subroutine, we can't store it in a string variable the way we stored subroutines presented in earlier installments of the BASIC/Assembly Line. Therefore, we need a *def seg* (line 160) to indicate the segment where the machine language code will be placed before it's stored on disk. If you have 96K or more of memory, change line 160 to read *def seg = &h1700;* this change will cause the subroutine to be stored outside BASIC's data segment, allowing you to take advantage of your extra memory.

Lines 180 through 460 are the main loop that reads the data statements and stores them in memory. Notice the code on line 210. When the program reads a data statement containing a negative value (in this case line 1060, which contains -24), it executes a gosub to line 360; the subroutine there sets the variable Fill% to the absolute value of the negative data element and then reads the next character in the data statement, which is a 0. We'll call this character that follows the negative data element a *fill* character. The *for-next* loop in lines 380 through 410 places the fill character into memory Fill% times; the effect in this case is to generate twenty-four 0s. This programming trick doesn't save a whole lot of effort in the present example, but it could pay off handsomely if you needed a buffer with 256 bytes of 0s.

Lines 260 through 320 perform a checksum routine to make sure you typed the data statements correctly. (If you're comparing this program to others published in the BASIC/Assembly line series, notice that the checksum routine, as well as the line that calls the checksum routine (line 280), are coded differently from the way they were in the previous programs; the changes were necessary to handle the fill-character additions.) If errors are found, a tone sounds, the message in line 490 is displayed, and the program stops. Otherwise, line 530 saves the program to disk under the name Filedump. Once that's happened, you can begin thinking about which files you want to examine.

```
10 '  ***** FILEDUMP *****
20 '
30 '  This subroutine will display any file in
40 ,        either character or hex format
50 '
60 '  WRITTEN BY HOWARD GLOSSER
70 '
80 '  ***** THIS BUILDS AND CHECKS THE SUBROUTINE
90 '
100 CLS
110 PRINT "Creating FILEDUMP Subroutine. . ."
120 '
130 CHECKCNT% = 0
140 LINENO% = 1030
150 '
160 DEF SEG = &HF00  ' Use def seg = &H1700 for machines with 96K or more
170 LOCATE 3,1,0 : COLOR 18 : PRINT "Reading DATA Statements. . ." : COLOR 7
180 FOR MEM% = 0 TO 647
190   READ DT%
200   IF CHECKCNT% = 8 THEN GOSUB 290 : READ DT%
210   IF DT% < 0 THEN CHECKSUM% = DT% : GOSUB 360 : GOTO 460
220   POKE MEM%,DT%
230   CHECKSUM% = CHECKSUM% + DT%
240   CHECKCNT% = CHECKCNT% + 1
250   GOTO 460
260 '
270 ' ** THIS PERFORMS CHECKSUM BY LINE
280 '
290   IF CHECKSUM% <> DT% THEN 490
300   LINENO% = LINENO% + 10
310   CHECKCNT% = 0 : CHECKSUM% = 0
320   RETURN
330 '
340 ' ** FILL MEMORY MODULE
350 '
360   FILL% = ABS(DT%)
370   READ DT%          'Character read here used for filling memory
380   FOR FILLOOP% = 1 TO FILL%
390     POKE MEM%,DT%
400     MEM% = MEM% + 1
410   NEXT
420   CHECKSUM% = CHECKSUM% + DT%
430   READ DT% : GOSUB 290
440   MEM% = MEM% - 1
450   RETURN
460 NEXT
470 READ DT% : GOSUB 290
480 GOTO 530
490 BEEP : PRINT "ERROR in DATA STATEMENT - Check line " LINENO% : END
500 '
```

UltraFile™-vs- The rest of the database/ file management world.



	PRICE	GRAPHING CAPABILITIES	CUSTOM REPORTS	HELP SCREEN	BROWSE FEATURE	AUTOMATIC DATA FORMATTING	BUILT-IN WHAT IF FUNCTION	ON-SCREEN CALCULATIONS	DATA VERIFICATION	USER DEFINED SCREENS	MULTI-KEY WORD SEARCH
ULTRAFILE	**$195.**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Friday!	$295.		X	X		X		X	X	X	
PFS: File, Graph, Rep.	$447.	X	X							X	X
Database Manager II	$295.		X		X			X	X		X
VisiFile	$300.		X							X	X

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If the recent database/file management explosion has left you in a state of confusion, you're not alone. We'd like to clear up some of that confusion.

We've taken the five most popular programs on the market and run a comparison so you can see for yourself exactly where they stand. And what you're getting for your money.

As you can see from the chart, dollar for dollar, feature for feature, UltraFile comes out on top. Here's why:

To begin with, UltraFile has filing, reporting and graphing capabilities all in one package. So, when you buy UltraFile, you automatically get everything you need for creating terrific graphs, custom reports, and managing and storing your information. And you get it all for $195.

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UltraFile also does on-screen calculations, has a handy "browse" feature for quickly scanning your data, and has a built-in "what if?" function so you can make projections. Plus, UltraFile talks to the most popular word-processing and spreadsheet programs (1-2-3, WordStar, VisiCalc and others), which gives you greater versatility.

When you stack it up against the rest, UltraFile has the most features for the best price. It just wouldn't make sense to consider anything else.

Available for: IBM PC/XT
Price: $195 complete.
File, Report and Graph.

For the name and location of the UltraFile dealer nearest you, or your free 64 page booklet, "Tips For Buying Software," please write or call:
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```
510 ' ***** THIS SAVES THE SUBROUTINE
520 '
530 BSAVE "FILEDUMP",0,648
540 LOCATE 3,1,1 : PRINT "FILEDUMP subroutine created"
550 END

1000 '
1010 ' ***** DATA STATEMENTS TO BUILD SUBROUTINE
1020 '
1030 DATA  235,  76, 144, 255,  63,  63,  63,  63,  962
1040 DATA   63,   6,   0,  32,  32,  32,  32,  32,  229
1050 DATA   32,  32,  32,  32,  32,  32,   0,   0,  192
1060 DATA  -24,   0,
1070 DATA    0,   0,   0,  32,   0,   0,  32,   0,   64
1080 DATA    0,   0,  48,  49,  50,  51,  52,  53,  303
1090 DATA   54,  55,  56,  57,  65,  66,  67,  68,  488
1100 DATA   69,  70,   0,   0,   0,   0,  85, 139,  363
1110 DATA  236,   6, 184,  36,   0, 185,   4,   0,  651
1120 DATA  247, 225, 191,   0,   0, 142, 199, 139, 1143
1130 DATA  248,  38, 255,  53,  38, 255, 117,   2, 1006
1140 DATA  184, 102,   2,  38, 137,   5, 140, 200,  808
1150 DATA   38, 137,  69,   2,  14,   7,  46, 199,  512
1160 DATA    6,  52,   0,   0,   0, 139,  94,  12,  303
1170 DATA  139, 119,   1, 128,  36, 223, 128,  60,  834
1180 DATA   79, 116,  18, 128,  60,  82, 117,   3,  603
1190 DATA  233, 131,   0,  46, 199,   6,  52,   0,  667
1200 DATA    1,   0, 233,  84,   1,  46, 198,   6,  569
1210 DATA   54,   0,  32,  46, 199,   6,  74,   0,  411
1220 DATA    0,   0,  46, 198,   6,  10,   0,   0,  260
1230 DATA   46, 141,  62,  10,   0, 139,  94,  10,  502
1240 DATA  139, 119,   1, 176,  15, 180,  41, 205,  876
1250 DATA   33, 139,  94,   8, 139, 119,   1, 128,  661
1260 DATA   60,  72, 117,   6,  46, 198,   6,  54,  559
1270 DATA    0,  72,  30,  14,  31,  46, 141,  22,  356
1280 DATA    3,   0, 180,  15, 205,  33,  31,  60,  527
1290 DATA    0, 116,  21,  60, 255, 116,   7,  46,  621
1300 DATA  163,  52,   0, 233,   3,   1,  46, 199,  697
1310 DATA    6,  52,   0,   3,   0, 233, 249,   0,  543
1320 DATA   46, 198,   6,  42,   0,   0,  46, 199,  537
1330 DATA    6,  22,   0,   0,   0,  46, 199,   6,  279
1340 DATA   24,   0,   1,   0,  46, 199,   6,  52,  328
1350 DATA    0,   6,   0, 233, 219,   0,  30,  14,  502
1360 DATA   31,  46, 141,  22,  51,   0, 180,  26,  497
1370 DATA  205,  33,  31,  46, 198,   6,  57,   0,  576
1380 DATA    0, 139,  94,  14, 139, 127,   1,  87,  601
1390 DATA    6,  30,   7, 185,  80,   0, 176,  32,  516
1400 DATA  252, 243, 170,   7,  95,  46, 128,  62, 1003
1410 DATA   54,   0,  32, 117,   3, 233, 134,   0,  573
1420 DATA   46, 161,  76,   0,  80, 232, 249,   0,  844
1430 DATA  137,   5, 131, 199,   2,  88,  46, 161,  769
1440 DATA   74,   0,  80, 134, 196, 232, 233,   0,  949
1450 DATA  137,   5, 131, 199,   2,  88, 232, 224, 1018
1460 DATA    0, 137,   5,  46, 131,   6,  74,   0,  399
1470 DATA   16, 185,  16,   0,  46, 141,  54,  51,  509
1480 DATA    0,  46, 137,  62,  55,   0, 184,  60,  544
1490 DATA    0,  46,   1,   6,  55,   0, 131, 199,  438
1500 DATA    5, 232, 137,   0,  46, 131,  62,  52,  665
1510 DATA    0,   0, 117,  93,  81,  80, 232, 176,  779
1520 DATA    0,  46, 128,  62,  57,   0,   8, 117,  418
1530 DATA    9,  46, 198,   6,  57,   0,   0, 131,  447
1540 DATA  199,   4,  46, 254,   6,  57,   0, 137,  703
1550 DATA    5,  88, 232, 135,   0,  89,  87,  46,  682
1560 DATA  139,  62,  55,   0, 136,   5,  46, 255,  698
1570 DATA    6,  55,   0,  95, 131, 199,   3,  73,  562
1580 DATA  227,  39, 235, 189, 235,  35, 185,  80, 1225
1590 DATA    0,  46, 141,  54,  51,   0, 232,  60,  584
1600 DATA    0,  46, 131,  62,  52,   0,   0, 117,  408
1610 DATA   16,  60,  13, 116, 241,  60,  10, 116,  632
1620 DATA    8, 232,  80,   0, 136,   5,  71, 226,  758
1630 DATA  229, 184,  36,   0, 185,   4,   0, 247,  885
1640 DATA  225, 191,   0,   0, 142, 199, 139, 248, 1144
1650 DATA   38, 143,  69,   2,  38, 143,   5,   7,  445
1660 DATA  139, 126,   6,  46, 161,  52,   0, 137,  667
1670 DATA    5,  93, 202,  10,   0,  30,  14,  31,  385
1680 DATA   46, 141,  22,   3,   0, 180,  20, 205,  617
1690 DATA   33,  60,   0, 116,  19,  60,   1, 117,  406
1700 DATA    9,  46, 199,   6,  52,   0,   6,   0,  318
1710 DATA  235,   8,  46, 163,  52,   0, 235,   2,  741
1720 DATA  138,   4,  31, 195,  60,  32, 124,   6,  590
1730 DATA   60, 127, 127,   2, 235,   2, 176,  46,  775
1740 DATA  195, 138, 224,  36, 240, 177,   4, 210, 1224
1750 DATA  232,  46, 141,  30,  58,   0,  46, 215,  768
1760 DATA  134, 196,  36,  15,  46, 141,  30,  58,  656
1770 DATA    0,  46, 215, 134, 196, 195,  88,  88,  962
1780 DATA   88,  88,  91,  89,  90,  94, 139, 199,  878
1790 DATA   95,  93,  31,   7,  60,   2, 117,   4,  409
1800 DATA   50, 228, 235,  11,  60,   4, 117,   4,  709
1810 DATA   50, 228, 235,   3, 184,   5,   0, 207,  912
```

Figure 1.

Look at That! The BASIC program in figure 2 demonstrates Filedump at work. It begins on line 50 by turning off the soft-key display at the bottom of the screen and reserving a portion of BASIC's data segment to hold the Filedump subroutine. If your machine has 96K or more and you have changed the *def seg* in line 60 to &H1700, the *clear* statement in line 50 is unnecessary.

Line 70 loads the subroutine into memory, and line 130 defines some of the variables your program will need when calling Filedump. Lne$ is an eighty-character field where a display line is built. Type$ is a one-character field that designates whether the display is to be in character or hex format. Retcd% is an integer variable that holds a return code from Filedump. The calling program will proceed according to the value of the return code, handling errors if necessary.

Lines 180 through 210 ask for the name of the file to be dumped. You can specify any file, even a hidden file or a system file; if the file isn't on the default drive, be sure to include the appropriate drive specifier.

If you want a hexadecimal display, follow the filename with a /H. Hex dumps are handy for (among other things) looking at com, exe, or tokenized BASIC programs, and for hunting for carriage-return-linefeed pairs (0DH 0AH) in ASCII files.

The first call to the Filedump routine is made in lines 260 through 280. Line 260 sets Opcode$ to "O" for *open*, and line 270 performs the call that opens the file to be dumped. Line 280 uses an *on-goto* statement to check the return code returned from the open operation. If Retcd% is anything other than 6 (which indicates successful completion), the appropriate error message in lines 540 through 580 is displayed and the program waits for further input. If Retcd% is 6, we fall through the *goto* logic to lines 320 through 430.

Line 320 resets Opcode$ to "R" for *read*, and line 360 resets Retcd% to 0. Lines 370 through 430 are a *while* loop that continues to execute until the end of file is reached, an error occurs, or someone hits the escape key to end the run prematurely. Line 380 checks for the escape key; if it hasn't been pressed, line 390 performs a call to the Filedump routine. During this call a full display line of file data is formatted into the string Lne$. Upon completion of the call, Retcd% is checked; if no errors have been found, Lne$'s contents are displayed on the screen.

The format of the dump will vary, depending on whether a character dump or a hex dump has been specified. In the first case, the file's contents are displayed character by character on the screen; carriage returns and line feeds are recognized and handled appropriately. If a hex dump has been selected, each line of the display will show the offset into the file, sixteen bytes of file data in hex, and the ASCII representation of those sixteen bytes (more or less in the manner of Debug). If a non-ASCII file is accidentally dumped in character instead of hex format, any values below hex 20 (decimal 32) or above hex 7F (decimal 127) will be converted to periods before being displayed on the screen.

If you opt to end the file dump by pressing the escape key, you will be given the option of dumping another file or leaving the program entirely. Pressing control-num lock when viewing the file momentarily suspends the screen display. Pressing any other key then resumes the scrolling. Also, while the BASIC example is designed to display the file on-screen, you can change line 420 to *lprint* and send the dump to the printer instead.

To try out Filedump, load BASIC or BASICA and place your Filedump disk in drive A and your system disk (containing DOS) in drive B. Load and run the demonstration program in figure 2. When you are asked for a filename type

B:IBMBIO.COM/H

and press enter. The contents of Ibmbio.com—one of the two hidden

files on your DOS disk—will appear in hexadecimal on the screen, and you might recognize some of the messages that appear on the far right around line 1100 of the dump. The other system file is Ibmdos.com, and you can display it just as easily.

If you ever encounter the situation in a BASIC program where you've seen the directory for a disk (perhaps using the *files* command) and you'd like to know the actual contents of a particular file, or if you're just curious and want to explore, Filedump could be your tool. Since the routine doesn't modify files, you can't hurt anything by looking. This is a starting point for your experiments, so use, modify, or tailor Filedump to fit your needs.

```
10 '  ***** THIS PROGRAM DEMONSTRATES FILEDUMP *****
20 '
30 '  ** DEFINE SEGMENT AND LOAD FILEDUMP
40 '
50 KEY OFF : CLEAR ,32768! 'This CLEAR is only necessary for 64K systems
60 DEF SEG = &HF00  ' Use def seg = &H1700 for machines with 96K or more
70 BLOAD "FILEDUMP",0
80 FILEDUMP = 0
90 '
100 '  ** CLEAR SCREEN AND DEFINE VARIABLES
110 '
120 CLS
130 LNE$ = STRING$(80,32) : TYPE$ = STRING$(1,32) : RETCD% = 0
140 LOCATE 1,15 : PRINT " ** DEMONSTRATE FILEDUMP SUBROUTINE **" : PRINT
150 '
160 '  ** GET FILENAME TO DUMP
170 '
180 LOCATE 3,1
190 INPUT "Name of file to dump (follow name with /H for hex dump) : ",NM$
200 IF RIGHT$(NM$,2) = "/H" OR RIGHT$(NM$,2) = "/h" THEN 210 : ELSE 220
210 NM$ = LEFT$(NM$,LEN(NM$) - 2) + " " : TYPE$ = "H"
220 PRINT
230 '
240 '  ** CALL TO OPEN THE FILE
250 '
260 OPCODE$ = "O"    ' Set OPCODE$ to OPEN
270 CALL FILEDUMP (LNE$,OPCODE$,NM$,TYPE$,RETCD%)
280 ON RETCD% GOTO 540,550,560,570,580
290 '
300 '  ** CALL TO DUMP THE FILE
310 '
320 OPCODE$ = "R"    ' Set OPCODE$ for READ
330 CLS : LOCATE 25,1 : COLOR 0,7
340 PRINT " Press ESC key to END Filedump on " NM$ " "; : COLOR 7,0 : PRINT
350 LOCATE 1,1,0
360 RETCD% = 0
370 WHILE RETCD% = 0
380    STP$ = INKEY$ : IF STP$ = CHR$(27) THEN 450 'Intercept the ESC Key to end
390    CALL FILEDUMP (LNE$,OPCODE$,NM$,TYPE$,RETCD%)
400    IF RETCD% = 6 AND MID$(LNE$,10,2) = SPACE$(2) THEN 430
410    ON RETCD% GOTO 540,550,560,570,580
420    PRINT LNE$;
430 WEND
440 PRINT SPC(9) STRING$(19,205) " END OF DATA " STRING$(19,205) : GOTO 460
450 PRINT SPC(9) STRING$(17,205) " FILEDUMP STOPPED " STRING$(16,205)
460 LOCATE ,,1 : BEEP
470 LOCATE 25,1 : PRINT "Press any key to continue or (S) to Stop" SPC(10);
480 CN$ = INKEY$ : IF CN$ = "" THEN 480
490 IF CN$ = "S" OR CN$ = "s" THEN 500 : ELSE 120
500 CLS : END
510 '
520 '  ** HANDLE RETCD% ERRORS
530 '
540 PRINT "OPCODE$ type must be O or R" : GOTO 460
550 PRINT "Drive not ready - Please close door or insert diskette" : GOTO 460
560 PRINT "File not found - Check filename and try again" : GOTO 460
570 PRINT "Disk media error - Diskette may be bad" : GOTO 460
580 PRINT "Device I/O error - Check that diskette has been formatted!" : GOTO 460
```

Figure 2.

```
                        ; FILEDUMP
                        ;
                        ; THIS ROUTINE WILL DUMP A FILE IN CHARACTER
                        ; OR HEX FORMAT AND IS CALLED FROM BASIC
                        ;
                        ; WRITTEN BY HOWARD GLOSSER
                        ;
0000                    CSEG        SEGMENT   PARA PUBLIC 'CODE'
                                    ASSUME    CS:CSEG
0000  EB 4C 90                      JMP       SETUP
0003  FF                WRKEXTEND   DB    255               ;EXTENDED CONTROL BLOCK
0004    05 [                        DB    5 DUP('?')        ;RESERVED FOR SYSTEM
            3F
               ]

0009  06                            DB    06H               ;INCLUDE HIDDEN AND SYSTEM FILES
000A  00                WRKDRV      DB    0                 ;DRIVE
000B    08 [            WRKNAME     DB    8 DUP(' ')        ;FILENAME
            20
               ]

0013    03 [            WRKEXT      DB    3 DUP(' ')        ;EXTENSION
            20
               ]

0016  ????              WRKCRBLK    DW    ?                 ;CURRENT BLOCK
0018  ????              WRKRECSIZ   DW    ?                 ;RECORD SIZE
001A  ????              WRKFLSIZL   DW    ?                 ;FILE SIZE (LOW WORD)
001C  ????              WRKFLSIZH   DW    ?                 ;FILE SIZE (HIGH WORD)
001E  ????              WRKFLDAT    DW    ?                 ;FILE DATE
0020    05 [            WRKRSVD     DW    5 DUP(?)          ;RESERVED
            ????
               ]

002A  ??                WRKCUREC    DB    ?                 ;CURRENT RECORD
002B    02 [            WRKRANDOM   DW    2 DUP(?)          ;RELATIVE RECORD NUMBER
            ????
               ]

002F  00 00 00 00       SAVEVECT    DD    0                 ;STORE THE INTERRUPT VECTOR
                        ;
0033  20                WRKDTA      DB    ' '               ;DISK TRANSFER AREA
                        ;
0034  0000              RETCD       DW    0                 ;RETURN CODE VALUES ARE. . .
                        ;
                        ;                                     1 = INVALID OPERATION
                        ;                                     2 = DRIVE NOT READY
                        ;                                     3 = FILE NOT FOUND
                        ;                                     4 = DATA ERROR
                        ;                                     5 = GENERAL DISK FAILURE
                        ;                                     6 = SUCCESSFUL COMPLETION
                        ;
0036  20                RUNTYPE     DB    ' '               ;TYPE OF RUN (CHAR OR HEX)
0037  0000              STRTCHAR    DW    0                 ;START OF CHARACTER PART OF HEX DUMP
0039  00                ACROSS      DB    0                 ;COUNTER OF HEX ENTRIES DISPLAYED
003A  30 31 32 33 34 35 HEX2TAB     DB    '0123456789ABCDEF' ;CONVERSION TABLE FOR XLAT
      36 37 38 39 41 42
      43 44 45 46
004A  00 00 00 00       BYTES       DD    0                 ;FILE BYTE COUNTER
                        ;
004E                    FILEDUMP    PROC  FAR
004E  55                SETUP:      PUSH  BP                ;SAVE BP FOR FAR RETURN
004F  8B EC                         MOV   BP,SP             ;MOVE STACK POINTER TO BP
0051  06                            PUSH  ES                ;SAVE ES REGISTER
0052  B8 0024                       MOV   AX,24H            ;INTERRUPT IS 24H
0055  B9 0004                       MOV   CX,4              ;DOUBLEWORD ADDRESS
0058  F7 E1                         MUL   CX                ;FIND ACTUAL ADDRESS
005A  BF 0000                       MOV   DI,0              ;SEGMENT 0
005D  8E C7                         MOV   ES,DI             ;LOAD ES WITH SEGMENT 0
005F  8B F8                         MOV   DI,AX             ;LOAD DI WITH OFFSET INTO SEGMENT
0061  26: FF 35                     PUSH  ES:[DI]           ;SAVE INTERRUPT OFFSET
0064  26: FF 75 02                  PUSH  ES:[DI]+2         ;SAVE INTERRUPT SEGMENT
0068  B8 0266 R                     MOV   AX,OFFSET CRITVECT ;NEW INTERRUPT VECTOR
006B  26: 89 05                     MOV   ES:[DI],AX        ;LOAD NEW OFFSET
006E  8C C8                         MOV   AX,CS             ;GET CURRENT SEGMENT
0070  26: 89 45 02                  MOV   ES:[DI]+2,AX      ;LOAD NEW SEGMENT
0074  0E                            PUSH  CS                ;STORE CS
0075  07                            POP   ES                ;LOAD CS TO ES
0076  2E: C7 06 0034 R 0000         MOV   RETCD,0           ;CLEAR RETURN CODE
007D  8B 5E 0C                      MOV   BX,[BP]+12        ;POINT BX AT PARM 1
0080  8B 77 01                      MOV   SI,1[BX]          ;GET OPERATION (OPEN OR READ)
0083  80 24 DF                      AND   BYTE PTR [SI],0DFH ;FORCE OPERATION TO CAPS
0086  80 3C 4F                      CMP   BYTE PTR [SI],'O' ;OPEN FILE?
0089  74 12                         JE    OPENSEQ           ;YES - GO TO OPEN SEQUENCE
008B  80 3C 52                      CMP   BYTE PTR [SI],'R' ;READ FILE?
008E  75 03                         JNE   TYPERR            ;NO - TYPE IS INVALID
0090  E9 0116 R                     JMP   READSEQ           ;GO TO READ SEQUENCE
0093                    TYPERR:
0093  2E: C7 06 0034 R 0001         MOV   RETCD,1           ;INVALID OPERATION
009A  E9 01F1 R                     JMP   RETURN            ;GO RETURN TO BASIC
009D                    OPENSEQ:
009D  2E: C6 06 0036 R 20           MOV   RUNTYPE,' '       ;CLEAR RUNTYPE
00A3  2E: C7 06 004A R 0000         MOV   BYTES,0           ;CLEAR BYTE COUNTER
00AA  2E: C6 06 000A R 00           MOV   WRKDRV,0          ;SET FOR DEFAULT DRIVE
00B0  2E: 8D 3E 000A R              LEA   DI,WRKDRV         ;POINT TO FCB
00B5  8B 5E 0A                      MOV   BX,[BP]+10        ;POINT BX AT PARM 2
00B8  8B 77 01                      MOV   SI,1[BX]          ;GET FILENAME
00BB  B0 0F                         MOV   AL,0FH            ;BITS ON IN AL REG FOR PARSE
00BD  B4 29                         MOV   AH,29H            ;PARSE FUNCTION
00BF  CD 21                         INT   21H               ;DOS INTERRUPT
00C1  8B 5E 08                      MOV   BX,[BP]+8         ;POINT BX AT PARM 3
00C4  8B 77 01                      MOV   SI,1[BX]          ;GET RUNTYPE
00C7  80 3C 48                      CMP   BYTE PTR [SI],'H' ;IS IT A HEX DUMP?
00CA  75 06                         JNE   OPENFILE          ;NO - GO OPEN FILE
00CC  2E: C6 06 0036 R 48           MOV   RUNTYPE,'H'       ;YES - SET RUNTYPE TO 'H'
00D2                    OPENFILE:
00D2  1E                            PUSH  DS                ;SAVE DS REGISTER
00D3  0E                            PUSH  CS                ;STORE CS
00D4  1F                            POP   DS                ;LOAD CS TO DS
00D5  2E: 8D 16 0003 R              LEA   DX,WRKEXTEND      ;POINT TO FCB
00DA  B4 0F                         MOV   AH,0FH            ;SET FOR OPEN FUNCTION
00DC  CD 21                         INT   21H               ;DOS INTERRUPT
00DE  1F                            POP   DS                ;RESTORE DS
00DF  3C 00                         CMP   AL,0              ;OPEN OK?
00E1  74 15                         JE    OPENOK            ;YES
00E3  3C FF                         CMP   AL,0FFH           ;FILE NOT FOUND?
00E5  74 07                         JE    NOFILE            ;YES - FLAG IT
00E7  2E: A3 0034 R                 MOV   RETCD,AX          ;MOV AX TO RETCD
00EB  E9 01F1 R                     JMP   RETURN            ;GO RETURN TO BASIC
00EE                    NOFILE:
00EE  2E: C7 06 0034 R 0003         MOV   RETCD,3           ;FILE NOT FOUND
00F5  E9 01F1 R                     JMP   RETURN            ;GO RETURN TO BASIC
00F8                    OPENOK:
00F8  2E: C6 06 002A R 00           MOV   WRKCUREC,0        ;SET CURRENT RECORD TO 0
00FE  2E: C7 06 0016 R 0000         MOV   WRKCRBLK,0        ;SET CURRENT BLOCK TO 0
0105  2E: C7 06 0018 R 0001         MOV   WRKRECSIZ,1       ;INDICATE A RECORD SIZE OF 1
010C  2E: C7 06 0034 R 0006         MOV   RETCD,6           ;SUCCESSFUL COMPLETION
0113  E9 01F1 R                     JMP   RETURN            ;END OF OPEN FUNCTION
0116                    READSEQ:
0116  1E                            PUSH  DS                ;SAVE DS REGISTER
0117  0E                            PUSH  CS                ;STORE CS
0118  1F                            POP   DS                ;LOAD CS TO DS
0119  2E: 8D 16 0033 R              LEA   DX,WRKDTA         ;POINT TO DTA
011E  B4 1A                         MOV   AH,1AH            ;SET FOR DTA FUNCTION CALL
0120  CD 21                         INT   21H               ;DOS INTERRUPT
0122  1F                            POP   DS                ;RESTORE DS
0123  2E: C6 06 0039 R 00           MOV   ACROSS,0          ;CLEAR ACROSS COUNTER
0129  8B 5E 0E                      MOV   BX,[BP]+14        ;POINT BX AT PARM 4
012C  8B 7F 01                      MOV   DI,1[BX]          ;GET PRINT AREA
012F  57                            PUSH  DI                ;SAVE DI (PRINT AREA)
0130  06                            PUSH  ES                ;SAVE ES REGISTER
0131  1E                            PUSH  DS                ;STORE DS
0132  07                            POP   ES                ;LOAD DS TO ES
0133  B9 0050                       MOV   CX,80             ;SET FOR 80 BYTE LINE
0136  B0 20                         MOV   AL,' '            ;PUT SPACE IN AL REGISTER
0138  FC                            CLD                     ;CLEAR DIRECTION FLAG - MOVE FWD
0139  F3/ AA                        REP   STOSB             ;FILL PRINT AREA WITH SPACES
013B  07                            POP   ES                ;RESTORE ES
013C  5F                            POP   DI                ;RESTORE DI (PRINT AREA)
```

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```
150 013D   2E: 80 3E 0036 R 20            CMP        RUNTYPE,' '       ;IS RUNTYPE BLANK?
151 0143   75 03                          JNE        READHEX           ;NO - DO HEX DUMP
152 0145   E9 01CE R                      JMP        READCHAR          ;YES - DO CHARACTER LISTING
153 0148                      READHEX:
154 0148   2E: A1 004C R                  MOV        AX,BYTES+2        ;BYTE COUNT (HIGH WORD) IN AX
155 014C   50                             PUSH       AX                ;SAVE AX REGISTER
156 014D   E8 0249 R                      CALL       HEXLAT            ;TRANSLATE BYTE IN AL TO HEX
157 0150   89 05                          MOV        [DI],AX           ;OUTPUT HEX CHARACTERS TO PRINT
158 0152   83 C7 02                       ADD        DI,2              ;BUMP PRINT POSITION 2
159 0155   58                             POP        AX                ;RESTORE AX
160 0156   2E: A1 004A R                  MOV        AX,BYTES          ;BYTE COUNT (LOW WORD) IN AX
161 015A   50                             PUSH       AX                ;SAVE AX REGISTER
162 015B   86 C4                          XCHG       AL,AH             ;EXCHANGE AL AND AH
163 015D   E8 0249 R                      CALL       HEXLAT            ;TRANSLATE BYTE IN AL TO HEX
164 0160   89 05                          MOV        [DI],AX           ;OUTPUT HEX CHARACTERS TO PRINT
165 0162   83 C7 02                       ADD        DI,2              ;BUMP PRINT POSITION 2
166 0165   58                             POP        AX                ;RESTORE AX
167 0166   E8 0249 R                      CALL       HEXLAT            ;TRANSLATE BYTE IN AL TO HEX
168 0169   89 05                          MOV        [DI],AX           ;OUTPUT HEX CHARACTERS TO PRINT
169 016B   2E: 83 06 004A R 10            ADD        BYTES,16          ;ADD 16 TO BYTE COUNT
170 0171   B9 0010                        MOV        CX,16             ;SET CX TO 16 FOR LOOP
171 0174   2E: 8D 36 0033 R               LEA        SI,WRKDTA         ;POINT TO DTA
172 0179   2E: 89 3E 0037 R               MOV        STRTCHAR,DI       ;STORE DI IN STRTCHAR
173 017E   B8 003C                        MOV        AX,60             ;POSITION STRTCHAR
174 0181   2E: 01 06 0037 R               ADD        STRTCHAR,AX       ;60 CHARACTERS AWAY
175 0186   83 C7 05                       ADD        DI,5              ;BUMP DI 5 FROM BYTE COUNT FIELD
176 0189                      RDHEX:
177 0189   E8 0215 R                      CALL       GETBYTE           ;GET A BYTE
178 018C   2E: 83 3E 0034 R 00            CMP        RETCD,0           ;IS RETURN CODE ZERO?
179 0192   75 5D                          JNE        RETURN            ;NO - THEN RETURN
180 0194   51                             PUSH       CX                ;SAVE CX REGISTER
181 0195   50                             PUSH       AX                ;STORE AX (BYTE OF DATA)
182 0196   E8 0249 R                      CALL       HEXLAT            ;TRANSLATE BYTE IN AL TO HEX
183 0199   2E: 80 3E 0039 R 08            CMP        ACROSS,8          ;HAVE 8 CHARACTERS BEEN DISPLAYED?
184 019F   75 09                          JNE        OKPUT             ;NO - PUT OUT SET OF HEX CHARACTERS
185 01A1   2E: C6 06 0039 R 00            MOV        ACROSS,0          ;YES - RESET ACROSS TO 0
186 01A7   83 C7 04                       ADD        DI,4              ;PUT A FEW SPACES IN MIDDLE OF DUMP
187 01AA                      OKPUT:
188 01AA   2E: FE 06 0039 R               INC        ACROSS            ;BUMP ACROSS BY 1
189 01AF   89 05                          MOV        [DI],AX           ;OUTPUT HEX CHARACTERS TO PRINT
190 01B1   58                             POP        AX                ;RESTORE AX
191 01B2   E8 023C R                      CALL       CONVERT           ;CONVERT AL TO PRINTABLE CHARACTER
192 01B5   59                             POP        CX                ;RESTORE CX
193 01B6   57                             PUSH       DI                ;SAVE DI (PRINT AREA)
194 01B7   2E: 8B 3E 0037 R               MOV        DI,STRTCHAR       ;POSITION IN CHARACTER PORTION
195 01BC   88 05                          MOV        BYTE PTR [DI],AL  ;OUTPUT AL TO PRINT AREA
196 01BE   2E: FF 06 0037 R               INC        STRTCHAR          ;BUMP PRINT POSITION
197 01C3   5F                             POP        DI                ;RESTORE DI (PRINT AREA)
198 01C4   83 C7 03                       ADD        DI,3              ;BUMP PRINT POSITION 3 BYTES
199 01C7   49                             DEC        CX                ;DECREMENT CX
200 01C8   E3 27                          JCXZ       RETURN            ;IF CX = 0 THEN EXIT
201 01CA   EB BD                          JMP        RDHEX             ;GO GET NEXT BYTE
202 01CC                      EXITHEX:
203 01CC   EB 23                          JMP SHORT  RETURN            ;ALL DONE - RETURN
204                           ;
205 01CE                      READCHAR:
206 01CE   B9 0050                        MOV        CX,80             ;SET FOR 80 BYTE LINE
207 01D1   2E: 8D 36 0033 R               LEA        SI,WRKDTA         ;LOAD SI WITH DTA ADDRESS
208 01D6                      READLOOP:
209 01D6   E8 0215 R                      CALL       GETBYTE           ;GET A BYTE
210 01D9   2E: 83 3E 0034 R 00            CMP        RETCD,0           ;IS RETURN CODE 0?
211 01DF   75 10                          JNE        RETURN            ;NO - THEN RETURN
212 01E1   3C 0D                          CMP        AL,0DH            ;IS CHARACTER A CARRIAGE RETURN?
213 01E3   74 F1                          JE         READLOOP          ;YES - DON'T WANT IT
214 01E5   3C 0A                          CMP        AL,0AH            ;IS CHARACTER A LINE FEED?
215 01E7   74 08                          JE         RETURN            ;YES - RETURN TO BASIC WITH PRINT AREA
216 01E9   E8 023C R                      CALL       CONVERT           ;NO - CONVERT BYTE TO CHARACTER
217 01EC   88 05                          MOV        BYTE PTR [DI],AL  ;OUTPUT CHARACTER TO PRINT AREA
218 01EE   47                             INC        DI                ;BUMP DI
219 01EF   E2 E5                          LOOP       READLOOP          ;GO GET NEXT BYTE
220 01F1                      RETURN:
221 01F1   B8 0024                        MOV        AX,24H            ;INTERRUPT IS 24H
222 01F4   B9 0004                        MOV        CX,4              ;DOUBLEWORD ADDRESS
223 01F7   F7 E1                          MUL        CX                ;FIND ACTUAL ADDRESS
224 01F9   BF 0000                        MOV        DI,0              ;SEGMENT 0
225 01FC   8E C7                          MOV        ES,DI             ;LOAD ES WITH SEGMENT 0
226 01FE   8B F8                          MOV        DI,AX             ;LOAD DI WITH OFFSET INTO SEGMENT
227 0200   26: 8F 45 02                   POP        ES:[DI]+2         ;RESTORE INTERRUPT SEGMENT
228 0204   26: 8F 05                      POP        ES:[DI]           ;RESTORE INTERRUPT OFFSET
229 0207   07                             POP        ES                ;RESTORE ES
230 0208   8B 7E 06                       MOV        DI,[BP]+6         ;POINT BX AT PARM 5
231 020B   2E: A1 0034 R                  MOV        AX,RETCD          ;LOAD AX WITH RETURN CODE
232 020F   89 05                          MOV        [DI],AX           ;MOVE RETURN CODE FOR BASIC
233 0211   5D                             POP        BP                ;RESTORE BP
234 0212   CA 000A                        RET        10                ;RETURN WITH 5 PARMS ON STACK
235 0215                      FILEDUMP    ENDP
236                           ;
237 0215                      GETBYTE     PROC       NEAR
238 0215   1E                             PUSH       DS                ;SAVE DS REGISTER
239 0216   0E                             PUSH       CS                ;STORE CS
240 0217   1F                             POP        DS                ;LOAD CS TO DS
241 0218   2E: 8D 16 0003 R               LEA        DX,WRKEXTEND      ;POINT TO FCB
242 021D   B4 14                          MOV        AH,14H            ;SET AH FOR READ
243 021F   CD 21                          INT        21H               ;DOS INTERRUPT
244 0221   3C 00                          CMP        AL,0              ;READ OK?
245 0223   74 13                          JE         READOK            ;YES
246 0225   3C 01                          CMP        AL,1              ;END OF FILE?
247 0227   75 09                          JNE        READERR           ;NO - READ ERROR
248 0229   2E: C7 06 0034 R 0006          MOV        RETCD,6           ;SUCCESSFUL COMPLETION
249 0230   EB 08                          JMP SHORT  ENDFILE           ;GET OUT
250 0232                      READERR:
251 0232   2E: A3 0034 R                  MOV        RETCD,AX          ;MOV AX TO RETCD
252 0236   EB 02                          JMP SHORT  ENDFILE           ;GET OUT
253 0238                      READOK:
254 0238   8A 04                          MOV        AL,BYTE PTR [SI]  ;MOVE THE BYTE TO AL
255 023A                      ENDFILE:
256 023A   1F                             POP        DS                ;RESTORE DS
257 023B   C3                             RET
258 023C                      GETBYTE     ENDP
259                           ;
260 023C                      CONVERT     PROC       NEAR
261 023C   3C 20                          CMP        AL,20H            ;IS AL A BLANK?
262 023E   7C 06                          JL         CHANGE            ;JUMP LOW TO CHANGE
263 0240   3C 7F                          CMP        AL,7FH            ;IS AL > 7F (127)
264 0242   7F 02                          JG         CHANGE            ;JUMP GREATER TO CHANGE
265 0244   EB 02                          JMP SHORT  NOCHG             ;DON'T CHANGE THE BYTE
266 0246                      CHANGE:
267 0246   B0 2E                          MOV        AL,'.'            ;CONVERT BYTE TO A '.'
268 0248                      NOCHG:
269 0248   C3                             RET
270 0249                      CONVERT     ENDP
271                           ;
272 0249                      HEXLAT      PROC       NEAR
273 0249   8A E0                          MOV        AH,AL             ;MOVE AL TO AH TO SAVE IT
274 024B   24 F0                          AND        AL,0F0H           ;AND AL TO DROP LOW BITS
275 024D   B1 04                          MOV        CL,4              ;SET CL FOR ROTATE RIGHT
276 024F   D2 E8                          SHR        AL,CL             ;SHIFT AL 4 BITS RIGHT
277 0251   2E: 8D 1E 003A R               LEA        BX,HEX2TAB        ;POINT TO HEX2TAB
278 0256   2E: D7                         XLAT       HEX2TAB           ;TRANSLATE AL BYTE TO HEX BYTE
279 0258   86 C4                          XCHG       AL,AH             ;SWAP AL AND AH
280 025A   24 0F                          AND        AL,0FH            ;AND AL TO DROP HIGH BITS
281 025C   2E: 8D 1E 003A R               LEA        BX,HEX2TAB        ;POINT TO HEX2TAB
282 0261   2E: D7                         XLAT       HEX2TAB           ;TRANSLATE AL BYTE TO HEX BYTE
283 0263   86 C4                          XCHG       AL,AH             ;SWAP AL AND AH
284 0265   C3                             RET
285 0266                      HEXLAT      ENDP
286                           ;
287 0266                      CRITVECT    PROC       NEAR
288 0266   58                             POP        AX                ;DOS REGISTERS (DO)
289 0267   58                             POP        AX                ; AT TIME OF (NOT)
290 0268   58                             POP        AX                ;   INT 24H (NEED)
291 0269   58                             POP        AX                ;RESTORE ALL REGISTERS TO THEIR
292 026A   5B                             POP        BX                ; STATE PRIOR TO INT 21H
293 026B   59                             POP        CX                ;
294 026C   5A                             POP        DX                ;
295 026D   5E                             POP        SI                ;
296 026E   8B C7                          MOV        AX,DI             ;PUT ERROR CODE IN AX
297 0270   5F                             POP        DI                ;
298 0271   5D                             POP        BP                ;
299 0272   1F                             POP        DS                ;
300 0273   07                             POP        ES                ;
301 0274   3C 02                          CMP        AL,02             ;DRIVE NOT READY?
302 0276   75 04                          JNE        CKDATA            ;NO - CHECK FOR DATA ERROR
303 0278   32 E4                          XOR        AH,AH             ;CLEAR AH REGISTER
304 027A   EB 0B                          JMP SHORT  RESUME            ;CONTINUE
305 027C                      CKDATA:
306 027C   3C 04                          CMP        AL,04             ;DATA ERROR?
307 027E   75 04                          JNE        GENFAIL           ;NO - CALL IT GENERAL DISK FAILURE
308 0280   32 E4                          XOR        AH,AH             ;CLEAR AH REGISTER
309 0282   EB 03                          JMP SHORT  RESUME            ;CONTINUE
310 0284                      GENFAIL:
311 0284   B8 0005                        MOV        AX,05             ;FLAG AS GENERAL DISK FAILURE
312 0287                      RESUME:
313 0287   CF                             IRET                         ;INTERRUPT RETURN
314 0288                      CRITVECT    ENDP
315                           ;
316 0288                      CSEG        ENDS
317                                       END
```

Figure 3.

Making Filedump Dump. Figure 3 is the commented assembly listing of Filedump. Although the comments narrate the events taking place, some parts of the program deserve more detailed explanation. For this discussion, you might want to familiarize yourself with the sections on function calls 0FH, 1AH, 14H, and 29H in Appendix D of the DOS manual.

Lines 11 through 38 define the file control block (FCB) that's used for the file to be dumped. Note the value of 06 in line 16; this allows Filedump to read hidden and system files, which have attributes of 02 and 04 respectively.

Since we'll be setting our own interrupt address for critical errors (INT 24H), a doubleword variable, Savevect, on line 40 stores the current interrupt address for critical errors (such as drive not ready) so that when Filedump is finished the prior interrupt vectors can be restored. Line 42 defines Wrkdta, a one-byte field used for the disk transfer area. The variable Runtype keeps track of the specified dump type (hex or character). Strtchar and Across are used in the hex dump portion to hold the address of where the character portion begins (the part at the far right) and the number of hex characters that have been displayed on a line. Bytes keeps track of the current location within a file, and Hex2tab is a translation table used with the XLAT instruction to convert characters to printable hex.

The first task the program undertakes (in lines 65 through 76) is the setting of the interrupt vector for critical errors (INT 24H) so that it points to our error-handling routine, located in lines 287 through 314. If we tried to read a file with the drive door open and we hadn't set this interrupt vector, our machine would probably take off for lunch; that's because our subroutine alters the contents of the DS register.

Once the program has determined whether to open or read the file, the proper code is executed. If neither open nor read has been specified, Retcd% is set to 1 and the program returns to Basic.

In the case of an open, the program branches to lines 91 through 128, where it picks up the dump type (character or hex), along with the filename. An attempt is then made to open the file. If the attempt is successful, a value of 6 is returned to the calling program in Retcd%; otherwise, Retcd% is set to 3, indicating "file not found."

If the call to Filedump is a read operation, then lines 129 through 152 set up the disk transfer area as well as clear the area where the display line will be built. For a character display, lines 208 through 219 are executed. The first operation in this routine is to call Getbyte, the routine at 237 through 258. This is a common read routine for both character or hex displays. It reads a byte; if it encounters the end of file, it so reports.

For a character display, after the byte has been returned, the Convert routine (lines 260 through 270) changes any nonprintable characters to periods. This loop continues until the eighty-byte line has been filled or the end of file has been reached.

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On the Hex Side. The routine for creating a hex dump is a bit more complicated. Lines 153 through 175 are responsible for creating the byte count that appears at the front of each line. The routine Hexlat in lines 272 through 285 takes any hexadecimal number, such as 5C, and converts it to a displayable equivalent, in this case 35H and 43H. The conversion is carried out with the help of the XLAT instruction, which does a table lookup using Hex2tab. Figure 4 illustrates this use of XLAT.

The body of the hex dump routine is in lines 176 through 201; here a file byte is retrieved, translated to hex, and put in the display line, and its ASCII equivalent is positioned to the far right. This process continues until the entire line has been filled (sixteen bytes have been read) or the end of file has been encountered.

When either routine has filled a display line, execution jumps to Return, located in lines 220 through 234. This is where the interrupt vectors (altered earlier) are restored, the return code is placed into Retcd%, and control is passed back to the Basic caller (with acknowledgment of five parameters on the stack).

Located at line 287 is Critvect, the actual code that handles a critical error. If such an error occurs while Filedump has control, this routine takes over. The first thing Critvect does is pop the first three words from the stack; these values were placed there at the time the critical error (INT 24H) occurred. Next, all the registers are restored to whatever states they were in before the INT 21H call to open or read the file was made.

The lower half of the DI register contains an error code indicating the type of error that has occurred. By checking this error code, Filedump can set its own error code so that the Basic program can handle the error. If we were to have the Filedump subroutine display error messages itself, we'd run into the problem of not knowing where to put a message without overlaying something already on-screen. Therefore, it's better to set a return code and let the caller handle the error.

Once the error code has been set, the IRET in line 313 allows a return to the body of the program (the code that was being executed at the time the error occurred). An IRET pops the first word on the stack into IP (the instruction pointer) and the second into CS. Finally, the third word restores the flags.

That's the Basic/Assembly line for this time. Next month we'll look at the challenge of getting Basic and assembly language to work together. ▲

BX contains the offset address (say F03D) of table HEX2TAB

HEX2TAB DB '0123456789ABCDEF'

with each byte in table positioned at the following address. . .

character	hex	address
0	30	F03D
1	31	F03E
2	32	F03F
3	33	F040
4	34	F041
5	35	F042
6	36	F043
7	37	F044
8	38	F045
9	39	F046
A	41	F047
B	42	F048
C	43	F049
D	44	F04A
E	45	F04B
F	46	F04C

Register AL contains 5C, to be converted to 2 displayable characters

Instruction Sequence	Register Results
MOV AH,AL	AX = 5C5C
AND AL,0F0H	AX = 5C50
MOV CL,4	
SHR AL,CL	AX = 5C05
LEA BX,HEX2TAB	BX = F03D
XLAT HEX2TAB	Add contents of AL (05) to BX (F03D) so BX = F042 At location F042 is 35 so AX = 5C35
XCHG AL,AH	After XCHG, AX = 355C
AND AL,0FH	AX = 350C
LEA BX,HEX2TAB	BX = F03D
XLAT HEX2TAB	Add contents of AL (0C) to BX (F03D) so BX = F049 At location F049 is 43 so AX = 3543
XCHG AL,AH	After XCHG, AX = 4335

Figure 4. An example of the use of XLAT.

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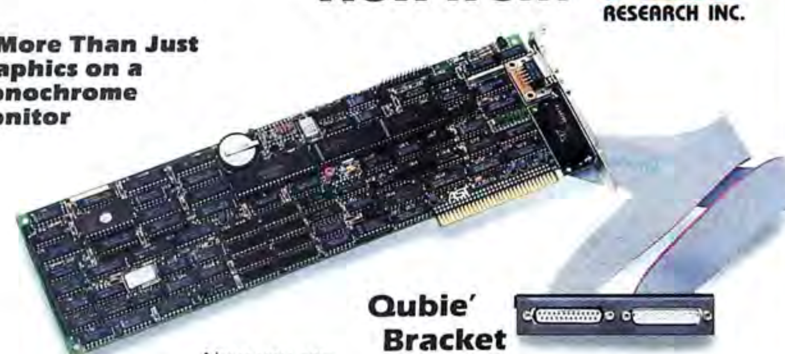

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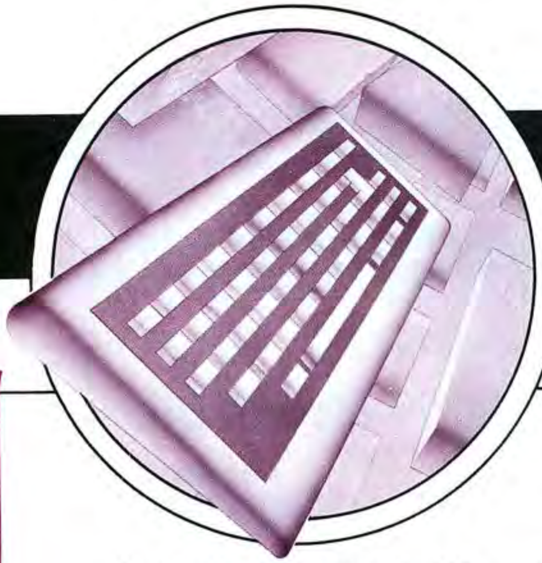

by Kathy Talley-Jones

Wildcards, *Copy,* and *Erase*

In April we looked at the *copy* command, and we watched as our PC*jr* neophyte, Jane Barrett, struggled with the files she'd created in writing her romance novel *Oh, Wilderness Were Paradise Enow.*

As you can see from the directory of Jane's working disk,

Volume in drive B is WILDERNESS

Directory of B:

CH1REV2	NVL	5888	4-20-84	7:15p
CH3REV3	NVL	1024	4-02-84	6:45p
CH5REV3	NVL	11776	3-30-84	2:28a
CH4	NVL	5760	4-16-84	8:19p
CH2REV3	NVL	11776	1-01-80	1:10a
PARENTS	LTR	5888	2-22-84	3:42p
CH2REV2	NVL	6369	3-29-84	11:31p

she has tried to name her files in an organized fashion to lessen the agony of keeping track of when she did what and which file is which.

One entry in her directory underscores the importance of answering truthfully when DOS prompts for the date and time. When Jane created Ch2rev3.nvl, she neglected to do this (she just hit return twice instead); as a result, she can now only guess when she worked on that file. When you're creating a lot of similarly named files, it's a good idea to take advantage of DOS's date-and-time stamp.

If you were with us during the last exciting episode in this series, you'll recall that Jane had decided to tidy up her work a bit—to copy all the latest versions of the chapters of her novel onto a freshly formatted floppy disk. By doing so, she will not only provide herself with an uncluttered data disk (free of material she no longer needs to look at), she'll also achieve a modest improvement in storage efficiency, because the files on her new disk will (at first, anyway) all be stored in physically contiguous disk sectors.

Jane will use the DOS *copy* command to duplicate selected files from her original data disk onto her new data disk; *diskcopy* wouldn't do, because it would copy the entire original disk. The *copy* command ordinarily works on one file at a time; there is, however, a way to make it copy several files at once.

As you'll recall, DOS doesn't allow you to use certain characters as parts of filenames. Two of the forbidden characters are the question mark and the asterisk; DOS uses these two characters as wildcards. Wildcards in DOS are rather like wildcards in poker; you can let them stand for whatever you want. The question mark and asterisk can save you a lot of time and effort when you're issuing commands to DOS.

Let's take a look at wildcards in action. Jane would like her working disk to contain only the third revisions of her chapters. By typing

COPY A:CH?REV3.NVL B:

she can copy these chosen files selectively with a single command.

Of course, there isn't any file on her original disk named Ch?rev3.nvl. There couldn't be, because DOS doesn't allow you to save a file under a filename containing a question mark. When DOS sees this command, it assumes that it's to copy *all* files on drive A (her original disk) whose filenames meet the following specifications: The first two characters are *Ch*, the fourth through seventh characters are *rev3*, and the extension is *nvl*. In other words, the command applies to files that have *any* character in position 3 of the filename (the position occupied by the question-mark wildcard), provided that everything else in the filename matches the specifications given. The question mark, thus, is a single-character wildcard.

Jane's command copies the following set of files to drive B (her fresh data disk):

CH3REV3	NVL	1024	4-02-84	6:45p
CH5REV3	NVL	11776	3-30-84	2:28a
CH2REV3	NVL	11776	1-01-80	1:10a

Suppose that Jane had wanted to copy a different set of files to her fresh data disk. Let's say she wanted to copy all her files from *Oh, Wilderness* but leave behind any other files (as you can see from the directory of her original working disk, an errant letter has crept onto the disk; she certainly doesn't want any missives to her parents rubbing sectors with torrid love scenes).

To copy all the *Oh, Wilderness* files, and only the *Oh, Wilderness* files, Jane would type

COPY A:*.NVL B:

The asterisk, unlike the question mark, can stand for more than one character (it's sometimes called a *global* wildcard for that reason); placed before the filename extension, it can stand for as many as eight characters—in other words, the entire filename up to, but not including, the extension. DOS would interpret the command shown above to mean "copy from drive A to drive B all files on drive A whose extension is *nvl.*"

The files would be copied one at a time, of course, and Jane would have to swap source and target disks a number of times; but she'd

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have to enter the *copy* command only once to move all her novel files onto the new

Both the question mark and the asterisk can be used in either the filename or the filename extension. And the two kinds of wildcards can appear in conjunction with one another. Moreover, because the question mark stands for a single character position only, you may at times find it convenient to include more than one question mark in a filename; commands of the form *copy a:ch?rev?.nvl b:*, for example, are perfectly legal. You could even ask DOS to *copy a:????????.??? b:*, although there wouldn't be much point in doing that; *copy a: *. * b:* would have the same effect as *copy a:????????.??? b:*.

Note that when DOS interprets the global wildcard character, the asterisk, it considers the filename and the extension to be entirely separate compartments; hence, if you want to copy everything, you have to put an asterisk in both positions—before and after the period. *Copy a: * b:* would duplicate only those files having no extension at all.

So far, we've seen Jane use the asterisk wildcard only in the form *copy a: *.nvl b:*—that is, to copy all files with extension *nvl*. The asterisk in this command represents the entire filename—the whole name of the file up to but not including the extension. Jane can also use the asterisk to represent only part of a filename. For example, let's suppose she wants to copy all versions of chapter 2. To do that, she can issue the command:

COPY CH2*.*

The first asterisk in this command (the one before the period) represents any characters appearing in positions 4 through 8 of the filename. DOS will respond to this command by copying all files of any extension the first three characters of whose filenames are *Ch2*.

***Copy* versus *Diskcopy*.** You may be wondering if the command *copy a: *. * b:* has the same effect as *diskcopy a: b:*. Not quite.

The two commands operate differently from one another. *Diskcopy* results in a track-for-track duplication of the source disk. DOS doesn't care what's on the disk when it does a *diskcopy*; it just creates an exact image of the original disk.

Copy, on the other hand, works file by file. Even when you use the command globally, as in *copy a: *. * b:*, DOS goes about its work one file at a time. For each file, it consults the disk directory and something called the File Allocation Table; then it goes to the sectors on the source disk that contain the data for the file in question, reads those sectors, pauses while you swap disks, and writes the data onto your target disk.

When you make a copy with *diskcopy*, any files that happen to be stored on the target disk at the time the command is executed are written over; the target disk becomes an exact image of the original. That is not the case with *copy a: *. * b:*. Files that are on the target disk at the time the *copy* command is carried out remain on the target disk; it's no problem to DOS if you already have some files on the target disk, provided that there's enough room for the new ones.

There are some other differences. As mentioned earlier, when the target of *copy a: *. * b:* is a freshly formatted disk, all files are laid down in physically contiguous disk sectors on the target, regardless of what shape they were in on the source disk. Finally, *copy a: *. * b:* results in the copying of only those files that show up in directory listings—the same files you see listed when you issue a *dir* command. It does not copy what are called *hidden* or *system* files. None of the files that you create as data files with word processors or other application programs fall into this category. But any time you format a disk with the /S option (that is, anytime you create a disk with the DOS system files on it—a disk that you can boot directly), you store a couple of files on that disk that do not show up in directory lists. These files, known to DOS as Ibmdos.com and Ibmbio.com., cannot be copied by means of *copy a: *. * b:*.

Even if Jane wanted to copy all her files from her original data disk to a backup, and

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even if there weren't any other files on her backup disk that she would want to avoid overwriting with *diskcopy,* there are two reasons she might prefer using *copy a: *. * b:* instead of *diskcopy a: b: *. *.* The first is that the arrangement of all her files in contiguous sectors on her backup disk would result in marginally improved performance by DOS; it takes less time to read a file that's stored in one large physical block than a file that's scattered around a disk. The second is that she might want to have different volume labels on her original and backup disks.

Because *diskcopy* duplicates a disk exactly, it copies the volume label right along with everything else. Maybe Jane wants her backup disk to be called Backup (she would have to use the /V option to give the disk that volume label at the time she formatted it) and her working disk to be called Wilderness. If she wants to preserve the volume label Backup on her target disk, she can't use *diskcopy.*

However, copying all files from one disk to another can be a time-consuming, error-plagued process on the PC*jr*; if you do this, it's a good idea to put a write-protect tab over the notch on your source disk. That will keep you from writing over original files in the event that you accidentally put the source disk in the drive when DOS is expecting the target disk.

When you're making a copy of a file, you can then rename it at the same time. If, for example, Jane decides to reorganize her novel and wants to make Chapter 2 the beginning of Chapter 4 at the time she copies the file for Chapter 2, she can tell DOS to

COPY A:CH2*.* B:CH4*.*

All files on the source disk whose filenames start with Ch2 will be copied to the target disk; on the target, however, their filenames will all start with Ch4 instead of Ch2.

You can also make a copy of a file on the same disk as the original; if you do this, you must rename the file in the process, because DOS will not tolerate two files with the same name on the same disk. If Jane wanted to have two versions of the same material on her original disk, for example, she could issue a command of the form:

COPY CH2REV2.NVL
CH4REV1.NVL

and both files would be there.

Incidentally, if you don't provide a drive specifier when you issue a *copy* command, DOS assumes you mean drive A, which is the Junior's default drive.

Erase. Jane is a very critical author, and she often likes to practice the computer equivalent of ripping up her manuscript and throwing it in the fire. The *erase* command lets her do this, and the same global characters that streamlined her use of the *copy* command work with *erase* as well.

Jane detested Chapter 2, in which Leticia tells her fickle lover Frank that she's leaving him to work as a simultaneous translator for the United Nations. An alternate revision of the chapter had Frank bidding Leticia adieu as he departed for Zimbabwe to operate as a mercenary soldier. To obliterate these touching scenes, Jane told DOS to

ERASE CH2*.*

and DOS obliged, annihilating Chapter 2.

As you can well imagine, *erase* is a destructive, and therefore potentially dangerous, command. It's easy to get into all kinds of trouble with *erase *. *,* which, of course, translates into *get rid of the whole thing.* If you issue the command

ERASE *.*

DOS will ask

Are you sure (Y/N)?

By typing *Y* and pressing enter, you tell DOS to go ahead; entering *N* tells DOS that you've reconsidered.

Erase, like *copy,* is an internal command, which means that you needn't put the DOS disk in the drive to make use of this command. There's an alternate form of the command, called *del.*

It might interest you to know that your file is not actually annihilated when you use the *erase* command. What happens instead is that DOS goes to the places where it keeps the information about what files are on disk and where they are stored. It makes changes to that information that let it know that the space occupied by the erased file is now available for reallocation. It does not actually go out to the affected disk sectors and somehow erase your data as you might rub out a word with the eraser at the tip of your pencil. Your old file remains intact until DOS needs to reassign those sectors.

Utilities are available (not from IBM but from third-party software vendors) that will help you recover erased files if you haven't yet caused DOS to overwrite them. There's no way to recover a file, of course, after DOS has overwritten it.

Jane has decided that she hates the whole idea of writing a romance novel. She can't quite decide what it's about—whether it should focus on Leticia's work as a simultaneous translator at the UN (besides, she doesn't know anything about the UN) or Frank's soldiering in Zimbabwe (she certainly doesn't know anything about mercenaries or Zimbabwe). The coincidence of their meeting at a UN Special Session and having the flames leap anew did seem a little forced. It's silly, stupid, frustrating, and a waste of time; she doubts she can ever sell it to Harlequin or anyone else.

But at least she's learned a lot about DOS. She takes out her backup disk and types:

ERASE *.*

and answers DOS's confirmation prompt with an emphatic Y. ▲

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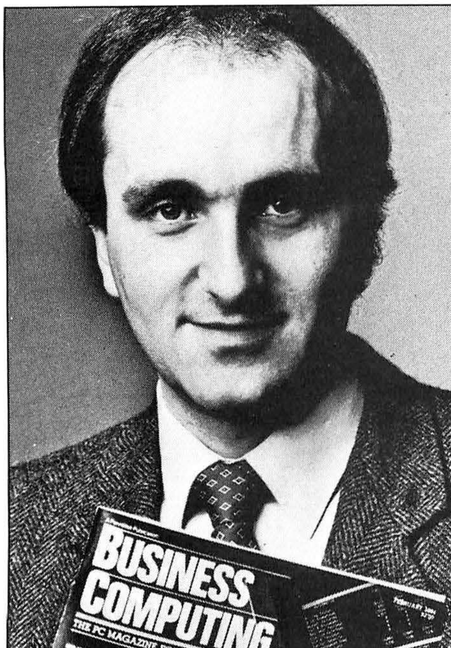

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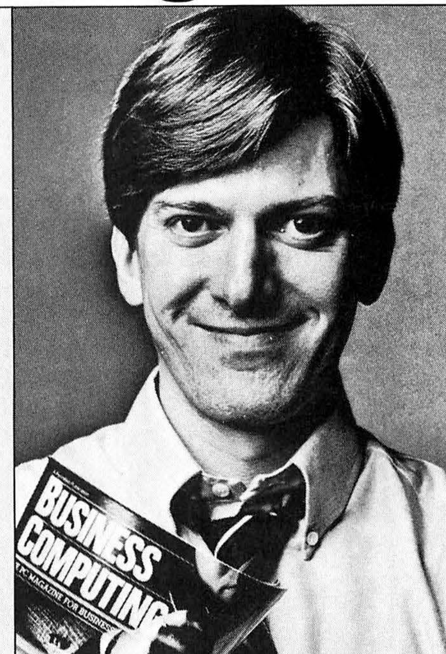

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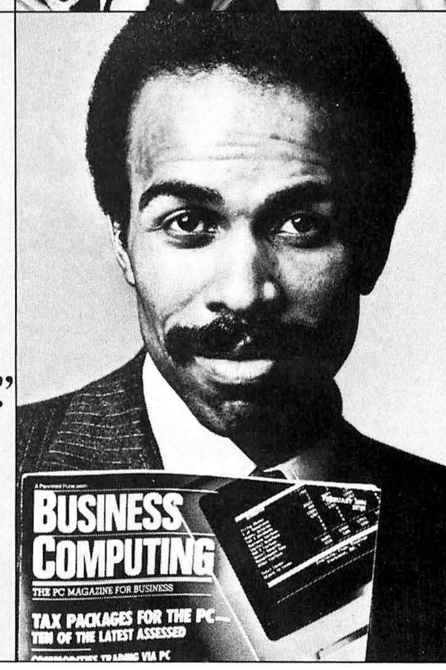

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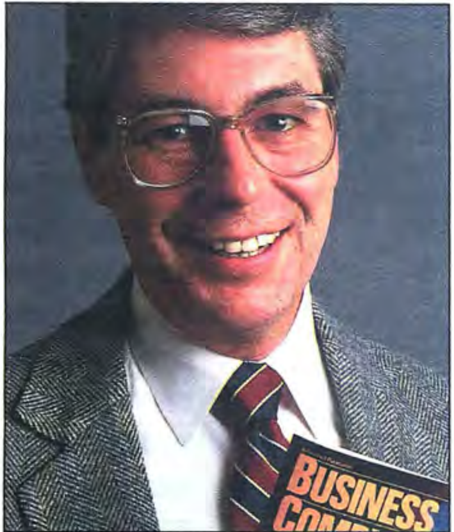

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SYSTEM Notebook

by Alan Boyd

The Directory and FAT under DOS 2

This month's column describes the organization of the directory and the File Allocation Table (FAT) under DOS 2. You might find it interesting to compare this discussion to the description of the directory and FAT under DOS 1 that appeared in the February 1983 installment of this column.

The Directory. Even though DOS 2 recognizes four disk formats—you have a choice of eight sectors per track and nine sectors per track on either a single- or a double-sided disk—its root directory takes up the same amount of disk real estate as DOS 1's single directory. That is, it requires either four sectors or seven sectors, depending on whether the disk is single-sided or double-sided (these requirements hold for both eight-sector and nine-sector disks). Subdirectories are stored differently from the root directory, as you'll see.

The number of files you can put in a directory is the same in DOS 2 as in DOS 1—64 entries for a single-sided disk and 112 entries for a double-sided disk. Of course, under DOS 1 there can be only one directory, whereas DOS 2 allows multiple directories.

When we looked at DOS 1, we saw that it allocates disk space one cluster at a time. DOS 2 allocates space in the same manner. On single-sided disks, a cluster is the equivalent of a single sector; on double-sided disks, a cluster is twice as large.

In fact, the only major difference in disk space requirements between the two versions of DOS lies in the FAT. DOS 1 requires only a single sector for the FAT, whereas DOS 2 requires double this amount for any disk formatted in nine sectors. This seems a small price to pay for the 12 percent additional storage that DOS 2 offers.

There have been several significant enhancements to the DOS 2 directory itself. Each directory entry is thirty-two bytes long, same as DOS 1, and the positional information has not changed; but several additional codes have been allocated to new features available under DOS 2.

Each DOS 2 directory entry is mapped as follows:

Bytes	Meaning
0–7	Filename—stored as an eight-byte ASCII string
8–10	Filename extension—stored as three ASCII bytes
11	File attribute byte
12–21	Reserved for future use
22–23	File creation or last change time
24–25	File creation or last change date
26–27	File starting cluster number
28–31	File size in bytes

The layout of the directory entry has not changed between versions of the operating system.

Come in late on "System Notebook"? All back issues of this column—from June 1982—are still available; for further information, see page 4. The columns will also be published soon, as a single volume, by Softalk Books.

The first byte of the filename field has a special significance under DOS 1: A hexadecimal E5 as the first byte indicates that the file has been erased. This method of flagging deleted files makes the operation of the *erase* command simple and fast. DOS 1 just has to locate the filename in the directory and change a single byte. The actual contents of the file are not physically removed from the disk.

Under DOS 2, the first byte of the filename still plays a significant role. An E5 in that byte still indicates that the file has been erased. Two other codes, however, have been added: hex 00 and 2E.

A hex 00 as the first byte indicates that the entry has never been used, permitting DOS to speed up the operation of the *backup* and *restore* commands.

DOS 1 and DOS 2 always allocate space for files in the same way. If the file already exists, then DOS simply determines where the next available cluster is and allocates that cluster to the file. When you create a new file, DOS searches through the directory until it finds an available entry. DOS needs to read only the first byte of each entry to determine availability. As soon as it discovers either an E5 or 00 in the first byte position of a directory entry, it knows it can quit searching and allocate the directory entry in question to the new file.

Since DOS always uses the first available directory entry whenever a new file is created, a 00 in position 1 of a directory entry tells the operating system that it has just entered virgin territory; that is, it tells DOS not only that the directory entry in question has never been used, but also that all directory entries following have never been used. The addition of this code to the directory system, therefore, enables DOS to speed up certain operations, such as the *dir* command, that require directory searches.

The other new code, hex 2E, tells DOS that the directory entry represents a subdirectory. Aside from this 2E code, the directory entry for a subdirectory is just like that for a regular file.

If the second position in the filename is also a 2E, this indicates that the starting-cluster number field in the directory entry actually points to the cluster number of the parent directory. This provides a road sign that leads DOS back up the directory tree.

There have been no changes to the filename extension field in DOS 2. However, the twelfth position (byte 11), the attribute byte, has changed in several ways. Under DOS 1, only the values 00, 02, and 04 were valid. These are still valid; however, four attribute byte codes have been added.

The attribute byte works on the bit level. The byte has eight bits that can be turned off and on individually. An attribute byte with bit 0 clear (bit 0 is the least significant, or rightmost, bit in the byte, and *clear* means the bit has a value of 0) represents a normal file. If bit 1 (the second bit from the right) is set (is equal to 1), the attribute byte indicates a hidden file, a file that won't be displayed during a directory listing. If bit 2 is set, the attribute byte indicates a system file, just as it did under DOS 1.

The new values for the attribute byte represent new file types and serve as indicators that can be set and checked by DOS. An attribute byte with bit 0 set indicates a read-only file. Any attempt to write to such a file will produce an error message. There is no DOS command that lets you designate a file as read-only, but this attribute is included in the directory system to allow application programs to lock files so they can't be written to accidentally.

An attribute byte with bit 3 set tells DOS that the directory entry doesn't contain the name of a file per se, but is actually the depository for the volume name that was specified when the disk was formatted. Since volume names are eleven characters long, the ASCII characters for them can be stored in the fields that usually contain the filename and extension. All the other fields in this type of entry are, by definition, irrelevant.

Volume name entries can be stored only in the root directory, and there can only be one per disk. Since one entry in the root directory is set aside to hold the disk volume name, the root directory's file storage capacity is reduced by one. That's not much of a sacrifice, however, given DOS 2's provision for subdirectories.

An attribute byte with bit 4 set designates a subdirectory. Although this type of entry shows up in directory listings obtained through the *dir* command, it's excluded from other kinds of directory searches.

Finally, an attribute byte with bit 5 set lets DOS know that the file has been written to. This bit is known as the *archive* bit and is used by commands such as *backup* and *restore*. Backing up a file clears the archive bit. The next time the file is written to and closed, the archive bit will be set once again. By examining the archive bit, a DOS command, or any other program, can determine whether or not the file has been modified since it was last backed up. Programs can therefore be written to manage only current information—information that's new since the last running of the program.

In many cases, several different bits in the attribute byte are set at the same time. For example, the system files Ibmbio.com and Ibmdos.com have their attribute bytes set to 00000111, indicating that they are system files, hidden files, and read-only files—all at once. There are, however, many attribute bit combinations that don't make sense to DOS; an example would be an attribute byte that indicated both a volume label and a subdirectory in the same entry.

The fact that the attribute bits are read individually leads us to a remarkable and undocumented feature of DOS, one that may be of interest to security-minded individuals. Since subdirectories are actually stored as regular DOS files, DOS 2 is capable of accommodating *hidden directories*. DOS doesn't provide you any way to create these strange animals, but if you have access to one of the utility programs (such as the *Norton Utilities*, Norrell's *Disk Magician*, or Photon's *Media Magician*) that allow you to modify the contents of a disk sector, then you might want to create a hidden subdirectory—just for fun.

To do this, first create a directory in the normal manner using the *mkdir* command.

A> MKDIR PRIVATE

Then, using a sector-examining-and-modifying utility, examine the directory sector on track 0 and notice that the attribute byte for the file containing the new directory has indeed been set to 10H (0001 0000B). By changing this value to 12H (0001 0010B), you can hide the subdirectory. A directory listing will confirm the change (it won't show your Private subdirectory).

You can log onto a hidden directory just as you would any other directory, by issuing the standard

A>CHDIR PRIVATE

command. Once you are logged on, the directory behaves as any normal subdirectory would. However, when you return to the parent, the subdirectory will appear to have vanished.

The other fields in the directory entry are the same in DOS 2 as in DOS 1. The reserved fields must not be used by application programs or modified by the user; they are marked reserved and must be respected as such. The starting cluster number is still normally set to 002, and the file size-bytes are still four bytes, or thirty-two bits, long.

The File Allocation Table. DOS 2's FAT differs from that of DOS 1 first in that the space management requirements for fixed disks dictate that the size of the new FAT be variable on demand. Second, codes have been added to define the additional device types, such as the fixed disk, that the operating system now has to recognize. In other respects, the working of the FAT is essentially unchanged.

The FAT is still DOS's road map through the various clusters on the storage devices DOS uses. However, its operation with clusters has been enhanced somewhat. As we saw when double-sized disks were first introduced, clusters are created first on the lowest track number on the lowest numbered disk side; after that, DOS addresses the next disk plane. This minimizes the amount of thrashing around that the disk head has to do to load or save a disk file, since it's most likely that the data will all be stored on adjacent tracks (although not necessarily on the same disk surface).

With fixed disks, the need to minimize the disk head's movement becomes even greater. The plane-priority scheme that was introduced

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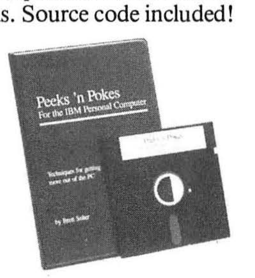

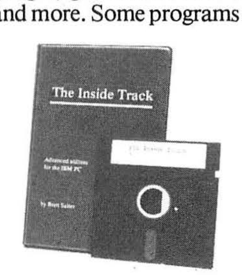

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with double-sided diskettes has therefore been extended to the multiple platters that make up a hard disk.

Entries in the DOS 2 FAT still consist of a twelve-bit block (one and one-half bytes), which can be thought of as three hexadecimal digits. Each twelve-bit block represents a cluster on the disk, so the actual size of the FAT can be determined by finding the number of clusters available for DOS. With floppy-based systems this is quite easy; with fixed disk systems it's entirely dependent on the amount of fixed disk space allocated for use under DOS.

The first two FAT entries are still dummy entries used to specify the type of disk media. These two FAT entries consist of a total of three bytes; the first contains the device code, and the second and third always hold a hex FFFF. The device codes DOS currently recognizes (officially) are:

Code	Device Type
FF	Double-sided diskette—eight sectors per track
FE	Single-sided diskette—eight sectors per track
FD	Double-sided diskette—nine sectors per track
FC	Single-sided diskette—nine sectors per track
F8	Fixed disk

As with DOS 1, this media ID FAT entry cordons off that part of the disk that isn't available for file storage—the part that contains the boot record, directory, and FAT tables themselves. This ensures that a file-creating or modifying program can never damage a disk by accidentally writing over these disk areas. The next FAT entry begins the mapping of the portion of the disk available for data.

As before, a FAT entry can exist in one of three states.

In the first of these states, the cluster represented by the FAT entry is not currently in use; the entry holds the value 000 to indicate that fact.

In the second possible state, the cluster pointed to by the FAT entry is in use; in this case the entry contains a number that represents a pointer to the next cluster in the file. This allows the FAT entry to do two things at once—to indicate that the cluster is in use and to point to the next cluster in the chain.

In the third state, the cluster represented by the FAT entry is in use, but it's also the last cluster associated with the file. In this case, the FAT entry contains a hex number between FF8 and FFF.

When a FAT overflows the single sector generally allotted for its use, it grabs a second sector, contiguous with the first. If it outgrows the second it grabs a third contiguous sector, and so on. For safety's sake, DOS 2, like DOS 1, maintains two copies of the FAT on every disk. The FAT is usually kept in memory on a high-priority basis within the buffers allocated by DOS for disk input and output. This means that DOS can achieve relatively high performance since it doesn't have to read the FAT from disk every time it needs to allocate space or retrieve a file.

Whenever there is a change in the FAT, as when a new file is created or an old one is updated, the new version is written out to the disk. This doesn't represent much of a performance degradation, since much of the time associated with disk input or output is simply the time required to bring the drive motor up to speed and for DOS to find its starting point. Since the disk is always brought up to speed during a write operation, there's little overhead associated with updating the disk version of the FAT. This means that the latest version is always stored—in duplicate—on the current disk. It also means that the disk can be physically removed from the disk drive without damage to a program's operation.

As you can see, DOS 2's file-management scheme is more complex than DOS 1's. Many of the features added to the later version have direct impact on the directory and FAT structures. DOS has grown a generation older and better, and the internal structure of the file system has been upgraded in a logical way. Other radical new features, such as networking and multitasking will, one hopes, be added to future versions of DOS in the same straightforward manner. ▲

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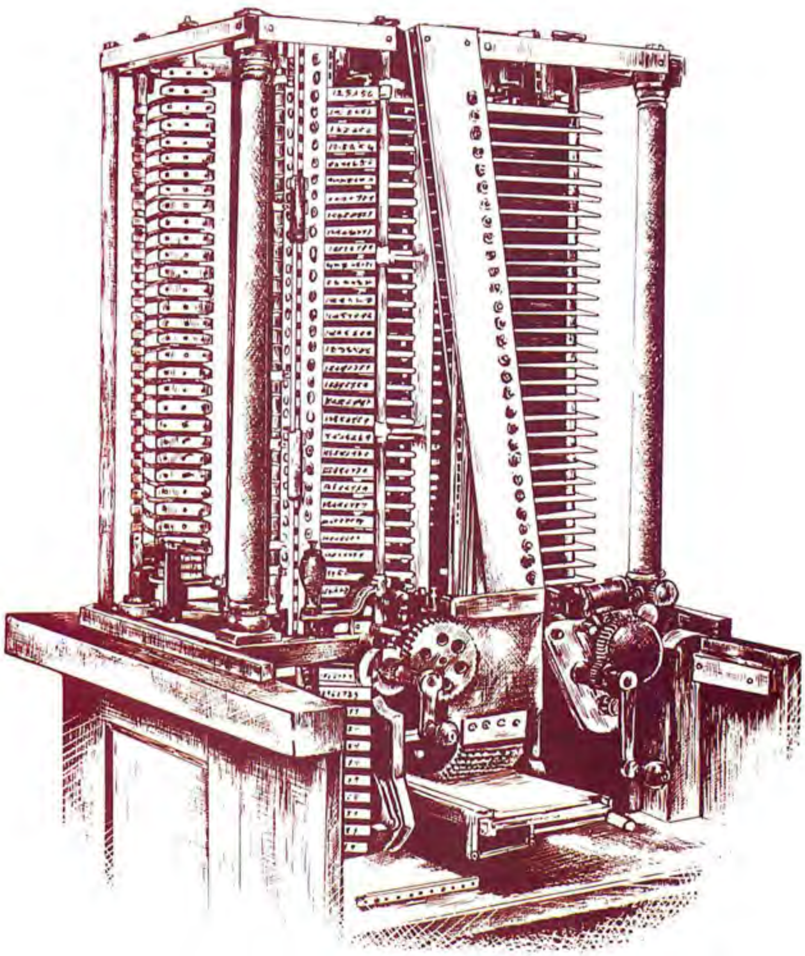

8087 SUPPORT FOR THE *MACRO ASSEMBLER*: FIVE ALTERNATIVES

BY ED BOGUCZ

One of the growing cottage industries spawned by the IBM PC's success revolves around Intel's 8087 Numeric Data Processor (NDP). As described in the first two installments of this series, the 8087 gives impressive number-crunching power to the PC family. The NDP's speed and accuracy make serious large-scale computation on PCs practical and open up a new arena of PC applications: large-scale scientific and engineering computing.

The potential of the fledgling 8087 market hasn't gone unnoticed by vendors. An increasing number of companies are scrambling to grab a piece of the 8087 action. Products include compilers and interpreters that support the NDP, application packages that use the chip, and assorted 8087 programming aids.

Users interested in the 8087 may be surprised to learn that they can't just plug in the chip and immediately take advantage of its virtues. By itself, the PC doesn't know to use the 8087; software must explicitly call the chip. The problem most new users confront is that none of the popular IBM languages can use the chip directly (the only current IBM language that supports the 8087 is APL).

One niche of the current 8087/PC market involves products that enable existing IBM languages to use the NDP. This month, we'll look at programming aids of this kind from five

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different firms. In future articles, we'll look at new compilers, interpreters, and other products that support the 8087 directly.

DATA FORMAT INCOMPATIBILITY

The primary problem in using the 8087 with existing IBM languages is that these products weren't designed with the 8087 in mind. In particular, the data format that stores real numbers in the IBM languages is incompatible with the format used by the NDP.

The data-format mismatch poses no serious difficulties in practice; users just need to be aware of how the translation between formats takes place in a given vendor's product. Indeed, the 8087 products discussed here handle the conversion in different ways. To get an idea of the issues involved, let's start by comparing the IBM and 8087 real-number formats.

Recall that computers store real numbers in a format similar to scientific notation. The *mantissa*, or *significand*, contains the number's significant digits, and the *exponent* holds its magnitude. For easier internal computations, the exponent is stored in a *biased* form. This means that a constant (the bias) is added to the actual exponent value in order that the biased exponents will always be positive. One bit of the format is reserved for the number's sign.

Within this fundamental approach for storing real numbers, different manufacturers and software houses are free to adopt whatever data format they choose. Decisions such as how many bits to assign to the exponent and where to put the sign bit are up to the author of the interpreter or compiler or to the designer of the floating-point processor.

In an ideal world, everyone would agree on a standard format. But any given format involves tradeoffs in programming ease and utility; none is suited to all applications. Understandably, the authors of the IBM languages from Microsoft and the chip designers at Intel chose different conventions to meet their differing design objectives.

Significantly, the Intel designers chose formats that are an important step toward industry standardization: The electrical and electronic engineering professional organization, IEEE, has adopted the formats as standards for microcomputer floating-point arithmetic.

The Microsoft (IBM) and Intel (IEEE) formats for single-precision and double-precision real numbers are shown in figure 1. For completeness, the format of the 8087 temporary real is also shown. The major features of the two formats (number of bits assigned to exponent and significand fields, as well as exponent bias) are summarized in table 1. Table 1 also lists the practical consequences of the layouts: the range and accuracy of the stored numbers.

Note that the formats for single-precision (thirty-two-bit) real numbers are similar for the IBM languages and the 8087: One bit holds the number's sign, eight bits are used for the (biased) exponent, and twenty-three bits hold the significand.

Despite these general similarities, the two formats are decidedly different. One important difference between the formats is the location of the sign bit: The IEEE standard format used by the 8087 stores the sign in the highest position, bit 31; the Microsoft/IBM format puts it in bit 23. Naturally, because of the difference in location of the sign bit, the two formats also differ in the location of the eight bits allocated for the biased exponent.

Exponent bias is another difference between the two formats: The Intel/IEEE format uses 127, while Microsoft/IBM uses 129. The practical consequence of this difference is that the range of numbers that can be represented in each format is slightly different (see table 1).

Obviously, numbers stored in one format can't be used immediately by something that wants to read the other scheme. A conversion between the two single-precision formats requires the following steps: (1) changing the position of the sign bit, (2) changing the position of the exponent, and (3) converting the exponent bias to the appropriate value.

The differences between the two formats are more significant for double-precision (sixty-four-bit) real numbers than for single-precision values. The most important difference is the number of bits allocated for the significand and exponent fields. The Intel/IEEE format uses

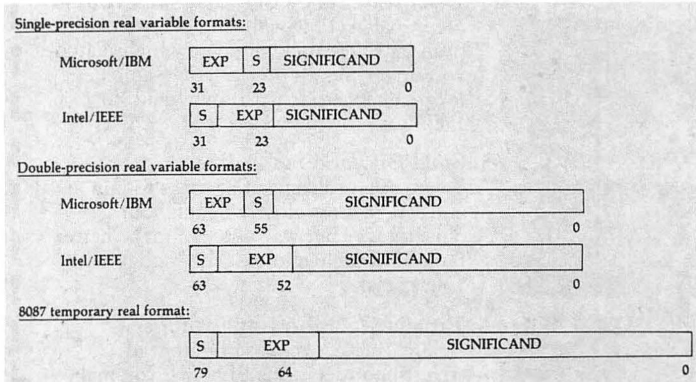

Figure 1. Comparison of real variable formats.
Note: "S" indicates position of sign bit.

Data Type	Total Bits	Exponent Bits	Exponent Bias	Significand Bits	Significant (Decimal) Digits	Approximate Range (Decimal)
Single-precision real:						
Microsoft/IBM	32	8	129	23	6−7	$2.9 \times 10^{-39} \le \lvert X \rvert \le 1.7 \times 10^{38}$
Intel/IEEE	32	8	127	23	6−7	$8.4 \times 10^{-37} \le \lvert X \rvert \le 3.4 \times 10^{38}$
Double-precision real:						
Microsoft/IBM	64	8	129	55	17	$2.9 \times 10^{-39} \le \lvert X \rvert \le 1.7 \times 10^{38}$
Intel/IEEE	64	11	1023	52	15−16	$4.2 \times 10^{-307} \le \lvert X \rvert \le 1.7 \times 10^{308}$
Temporary real:						
Intel	80	15	16383	64	19	$3.4 \times 10^{-4932} \le \lvert X \rvert \le 1.2 \times 10^{4932}$

Table 1. Data type characteristics.

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eleven bits for the exponent; the Microsoft/IBM format uses the same number as for single-precision variables—eight. Naturally, the number of bits in the significand fields also differs by three: fifty-two bits for the significand in the Intel/IEEE format, fifty-five bits in Microsoft/IBM. The formats also differ in the location of the sign bit.

Differences in the sizes of the exponent and significand fields affect more than just the physical layout of information. They result in important differences in the range and accuracy of numbers stored in the two formats (see table 1). More bits in the exponent of the Intel/IEEE format mean that it can offer a greater range in values; more bits for the significand in the Microsoft/IBM format mean that, within its range, it can provide greater precision.

In converting between the two double-precision formats, programmers sometimes must settle for the limitations of both worlds: Results stored under this compromise approach have the eight-bit exponent and range of the Microsoft/IBM format and the fifty-two-bit significand and precision of the Intel/IEEE scheme. This hybrid double-precision format effectively uses sixty-one bits; the consequences of "losing" three bits are probably not crucial to most applications.

Proper conversion between formats is fundamental to successful use of the 8087 with any of the popular IBM languages. Careless mixing of storage conventions only invites headaches— not to mention IBM's infamous "unpredictable results." How the format mismatch is handled is an important consideration in the evaluation of programming aids.

Ideally, format conversions should be transparent to the user. In addition, required format conversions should be kept to a minimum, since the translations take time. Packages that constantly swap between formats generally are slower than those that calculate according to one standard.

8087 SUPPORT SOFTWARE

At least five companies have entered the 8087 market with products for IBM languages: Field Computer Products, Hauppauge Computer Works, MicroWare, Seattle Computer, and SolveWare. Products include programming aids and libraries that provide 8087 support for the IBM *Macro Assembler,* and the BASIC, Pascal, and FORTRAN compilers. The companies' offerings are summarized in table 2.

The firms typically market their products in several different packages—many of which include an 8087. A summary of the various packages is given in table 3. In reviewing table 3, note that Intel's list price for the 8087 is $223. Third-party vendors generally follow the suggested list for the chip alone but apparently offer discounts for chip-and-software packages (IBM charges $260 for the 8087—also known as the "math coprocessor option").

Note that not all installed 8088 chips are compatible with the current 8087. Some 8088s installed in early PCs must be replaced with a newer version. You can tell whether your 8088 will work with the 8087 by looking at the copyright dates stamped on it. If it has two dates (1978, 1981), the chip is all right. If only one date is shown (1978), the chip will have to be replaced. Vendors generally deal with the problem of incom-

FROM A TYPICAL USER'S PERSPECTIVE, THE MOST INTERESTING PRODUCTS PROBABLY ARE 8087 SUPPORT FOR ASSEMBLY LANGUAGE AND BASIC PROGRAMMING.

patible 8088s either by selling a "matched set" of chips in the first place or by offering to exchange a user's outdated 8088.

From a typical user's perspective, the most interesting products probably are 8087 support for assembly language and BASIC programming. Most of the products on the market concentrate on these two applications. This month, we'll take a closer look at the programming aids available for the IBM *Macro Assembler*. Next month, 8087 libraries for IBM's BASIC compiler will be reviewed; in the same article we'll also discuss so-called primitive-function libraries, which allow a user to write assembly language routines for the 8087 from within BASIC.

IBM MACRO ASSEMBLER SUPPORT

The primary difficulty in programming the 8087 with the current IBM *Macro Assembler* (*Masm*) is that the assembler's vocabulary doesn't include mnemonics for NDP instructions. A secondary problem of using *Masm* for 8087 programs is that it encodes real numbers in the Microsoft/IBM format. (Characteristically, IBM hasn't announced its intentions for future versions of its assembler; note, however, that Debug 2.0 includes the capability to assemble and unassemble 8087 mnemonics.)

	FIELD	HAUPPAUGE	MICROWARE	SEATTLE	SOLVEWARE
IBM MACRO ASSEMBLER:					
8087 mnemonics preprocessor			X		
8087 mnemonics macro library	X	X	X	X	X
MASM patch for IEEE constants			X		
Data format conversion routines	(1)	(1)	(1)		X
Transcendental function routines		X	X		X
I/O routines			X		X
Higher-level macros			X		
IBM BASIC COMPILER:					
Compiler library (replaces Bascom.lib)		X	X	X	
Runtime module (replaces Basrun.exe)			X		
8087 primitive function library	X		X		
IBM PASCAL COMPILER:					
Compiler library		X	X		
8087 primitive function library	X				
IBM FORTRAN COMPILER:					
Compiler library		X			

NOTES:
(1) Single-precision data format conversion routines only.

Table 2. 8087 software support for IBM languages.

Despite the lack of 8087 mnemonics in the IBM *Macro Assembler* vocabulary, you can use this assembler to program the NDP. To drive the 8087, you have to "assemble" NDP operations manually and place the appropriate machine codes directly into your program. For example, the 8087 instruction FSQRT, which replaces the top of the stack by its square root, has the two-byte (hexadecimal) machine code D9 FA; hence the IBM *Macro Assembler* statement

```
DB  0D9H,0FAH
```

results in the execution of FSQRT. Operations that involve memory addressing—loading and storing variables, for example—are coded by means of the assembler's ESC (escape) instruction.

Naturally, any self-respecting programmer views the prospect of encoding machine instructions manually with disdain. The method is tedious and error-prone. A better approach to the problem is to automate the encoding: Let the computer do the work of putting 8087 instructions in a form suitable for the IBM assembler.

Field Computer Products 909 North San Antonio Road Los Altos, CA 94022 (415) 949-3457		
M8087.Mac	Macro library of 8087 instructions.	$ 50.
Basic87	8087 primitive library for BASIC compiler.	$ 50.
Pas+87	8087 primitive library for Pascal compiler.	$ 50.
Hauppauge Computer Works 358 Veterans Memorial Highway Commack, NY 11725 (516) 360-3827		
87/88 chip set	8087 with compatible 8088.	$195.
87 Software Pak	Macro library for *Masm*, and compiler libraries for BASIC, Pascal, and FORTRAN.	$180.
87 Math Pak	*87 Software Pak* and 87/88 chip set.	$325.
87 Macro Pak	Macro library for *Masm* and 87/88 chip set.	$275.
MicroWare Box 79 Kingston, MA 02364 (617) 746-7341		
8087	Chip and 8088 exchange if necessary.	$175.
87Macro	Preprocessor, macro library, transcendental-function-object library, utility macros, and *Masm* patch for IEEE constants.	$150.
87Basic	Compiler library and runtime module for BASIC.	$150.
87Basic+	8087 primitive function library for BASIC.	$ 75.
87Pascal	Compiler library for IBM Pascal.	$150.
Fastpak	8087 chip, the 87/88 Guide (reviewed last month) and your choice of *87Macro*, *87Basic*, or *87Pascal*.	$325.
Seattle Computer 1114 Industry Drive Seattle, WA 98188 (800) 426-8936		
Flash Calc	8087 macros and BASIC compiler library.	$ 89.95
Solveware Box 1246 Redondo Beach, CA 90278 (213) 543-4242		
Sevenware	*Masm* macro library, and test and introductory programs.	$109.
	With 8087:	$309.
Trig87	Object library of trigonometric routines.	$ 24.
I/O 87	Library of I/O and conversion routines. .	$ 24.
	Trig87 and *I/O 87* when purchased with *Sevenware*:	$ 39.

Table 3. 8087 Software vendor packages.

...STRONG TYPING IS DESIRABLE IN AN ASSEMBLER. WITH STRONG TYPING, PROGRAMMERS ARE FREE TO WORRY ABOUT THE LOGICAL DETAILS OF THEIR CODE...

There are two ways to achieve this automation. The first is to use a standalone program to preprocess assembly language source code and translate all 8087 instructions to a form suitable for handling by *Masm*; the second is to use the IBM assembler's facility for macroprocessing, defining each 8087 mnemonic as a macro (macros are like subroutines for the assembler; when the assembler finds a macro in your source code, it substitutes the previously defined statements). Assembly language programming aids for the 8087 all use one or the other of these two methods (see table 1).

INTEL'S ASSEMBLER

For the purpose of discussion, it's instructive to compare the various 8087 programming aids with Intel's own assembler, *Asm86*, which does support NDP instructions (*Asm86* is not available in PC-DOS). All the current IBM *Macro Assembler* extensions emulate the Intel assembler to some extent.

One attractive feature of *Asm86* is that it's a *strongly typed* assembler. This means that, once a variable or label has been defined, the assembler remembers the variable or label's type. The IBM *Macro Assembler* is also a strongly typed assembler. (IBM Basic implements strong typing via the *defint*, *defsng*, and *defdbl* statements.)

A strongly typed assembler is an asset for the 8086/8088 and 8087 because of the number of different data types these processors employ. For example, the 8087 can load real numbers in any of three formats: short, long, and temporary real. *Asm86* uses one mnemonic—FLD—for loading any real variable, even though different machine instructions are required for each variable type. Because the assembler knows the type of each operand, it's able to generate the appropriate machine code. Thus, if SHORT_REAL has been defined (by means of the assembler's DD pseudo-op) as a thirty-two-bit variable, the statement

FLD SHORT_REAL

will be assembled by *Asm86* into the appropriate machine code.

Without strong typing, different statements would be required for operations involving different variable types. For the real-number load operation, for example, three different statements would have to be available to delineate the various load operations.

The point is that strong typing is desirable in an assembler (although admittedly this is a matter of personal preference). With strong typing, programmers are free to worry about the logical details of their code; without it, they must know the type of each variable at all times. In addition, the assembler's instruction set is likely to be more complex.

8087 ASSEMBLY LANGUAGE SUPPORT

Now let's take a look at the various products intended to give the IBM *Macro Assembler* an 8087 vocabulary. Of the two approaches described previously (running source code through a standalone preprocessor and defining macros for the 8087 instructions), the latter is used in the products from all five companies discussed here. Four of the five rely on this approach exclusively; MicroWare is the only firm that offers a standalone 8087 instruction preprocessor.

Products that rely on macroprogramming consist of a text file of assembly language code that's meant to be processed by *Masm* along with your program (vendors typically recommend that you employ *Masm*'s INCLUDE statement to bring their products into your program). This text file—often called a macro library— defines all the 8087 instructions as macros. Thus when *Masm* hits an 8087 instruction in your program, it substitutes the appropriate code.

Macroprogramming of 8087 instructions is a seemingly elegant solution to the problem of NDP programming with the IBM *Macro Assembler.* After all, it uses a principal feature of this assembler: its ability to handle macros. However, reliance on macroprocessing can have a significant practical drawback: long assembly times. The problem is that vendor text files typically are large and complicated, and your program is made considerably longer and more complex when you INCLUDE them. Processing times for each of the products reviewed here are listed at the end of the article.

In spite of potentially lengthy assembly times, however, the macroprogramming approach does offer advantages. For example, macros can use the *Masm*'s TYPE operator, so it is possible to make 8087 instruction macros that recognize the type of a variable. In addition, you can easily expand vendor macro files to meet special needs.

In terms of functionality and emulation of Intel's *Asm86*, the best package of 8087 instruction macros is the one marketed by SolveWare. In particular, SolveWare's product is the only one in which the 8087 macros are strongly typed. The only problem with this package is that you pay dearly for its convenience: Assemblies are painfully slow. Indeed, the SolveWare package produces the longest typical processing times of any of the products reviewed here. Many users will find SolveWare's assembly times unacceptably long.

This speed liability is especially regrettable because SolveWare has the most user-friendly package around. Documentation is very good and is professionally presented in a loose-leaf IBM-style notebook. There's a chapter on the 8087 instruction set that you can insert directly into your *Masm* manual. In addition, two unique introductory programs are provided with the basic package. One program tests the 8087 to verify that its functions are operating properly. The on-screen text of this program serves as a good introduction to the NDP instruction set. The second program includes an interactive demonstration of the 8087's speed and accuracy that's ideal for new users of the NDP.

Additional 8087 programming aids available from SolveWare include object libraries of trigonometric functions and screen-to-NDP input/output routines. Assembly language programs for conversions between the Intel/IEEE and Microsoft/IBM formats are also available.

SolveWare's dismal assembly speed is due to the complexity of its macro library. Faster processing can be achieved, but only by compromising 8087 macro features. For example, SolveWare's strongly typed macros can be traded for code that must be told explicitly the type of each operand. The other vendors' products take this approach.

Without strong typing, the other packages must identify operand types either by using attribute operators or by creating different mne-

monics for different types. Attribute operators are keywords that tell the assembler an operand's type. They are used in three of the 8087 macro libraries reviewed here. MicroWare's products opt instead for using different mnemonics.

Macro libraries from Field Computer Products, Hauppauge Computer Works, and Seattle Computer use attribute operators to specify the type of each operand (naturally, the qualifiers are required only in instructions such as FLD that allow more than one operand type). The different packages use different keywords to specify operand types.

Seattle's uses the standard Intel attribute keyword PTR to specify operand type (as either DWORD, QWORD, or TBYTE). Thus, the Seattle package accomplishes a load of the thirty-two-bit variable SHORT_REAL by

```
FLD  DWORD PTR SHORT_REAL
```

Macro libraries from Field and Hauppauge take a similar approach but have their own attribute keywords (for instance, Field uses SHORT to specify thirty-two-bit variables; Hauppauge uses just S). Aside from requiring you to type all memory operands explicitly, the macro libraries from Field, Hauppauge, and Seattle closely follow Intel vocabulary and syntax. All three libraries process 8087 code faster than SolveWare's product, but there are significant differences in assembly times between each library. (Field's is listed and discussed in the August 1983 issue of *Byte* magazine; interested readers should see that article for a detailed discussion of the making of an 8087 macro library.)

MicroWare's products use the alternative approach to the problem of specifying operand type—different mnemonics for different operand types. While this practice has the drawback of increasing the number of NDP instructions, MicroWare's mnemonics are formed in a consistent and easily remembered way from Intel's *Asm86* instructions. Indeed, MicroWare likes to call its mnemonics a "dialect" of Intel's. For example, the MicroWare mnemonics for the short, long, and temporary real load operations are FSRLD, FLRLD, and FTRLD respectively.

On first examination, some users may find MicroWare's adoption of non-Intel mnemonics objectionable; different mnemonics can cause confusion (Debug 2.0 uses standard Intel mnemonics), and they cut down on portability of code. Notwithstanding these valid concerns, however, MicroWare's product is the most powerful and useful 8087 support package for the IBM *Macro Assembler* on the market today.

The package includes a preprocessor that converts 8087 instructions to statements recognized by the IBM assembler, a library of 8087 instruction macros, a set of powerful macros that give the NDP programmer higher-level statements, and an object library that includes routines for transcendental functions, encoding, decoding, and conversions. In addition, MicroWare will patch a user's copy of the IBM *Macro Assembler* so that it produces IEEE-format constants (in DD, DQ, and DT statements). The patch eliminates the IBM-to-8087 format mismatch problem.

MicroWare's preprocessor is intended to be the user's primary tool for converting 8087 instructions into a form recognized by the IBM assembler. In practice, one feeds code through the preprocessor and

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PREPROCESSING IS NOT A PANACEA FOR THE PROBLEM OF HANDLING 8087 CODE WITH THE CURRENT IBM ASSEMBLER.

then through IBM's *Masm*. The program is said to process source code at 1,500 lines per minute. To increase effective processing speed, you can turn the parsing on and off at various points in your program by means of preprocessor pseudo-ops. The combined use of MicroWare's preprocessor with *Masm* generally results in much faster total assembly times than is possible with the other vendors' macro libraries. Programmers who write lots of 8087 code will find the preprocessor to be the best approach to assembling NDP programs with the IBM's current assembler.

MicroWare's preprocessor has the additional virtue of being able to produce detailed comments for each 8087 statement. The comments are simple line diagrams that show the effect of an operation on the NDP stack; they're useful for the debugging of programs, and they're especially helpful for beginning programmers. You can turn the preprocessor's comment feature on or off anywhere in a program.

Preprocessing is not a panacea for the problem of handling 8087 code with the current IBM assembler. For large programs that have few 8087 instructions, instruction macros may be a speedier method than preprocessing. MicroWare recognizes this fact and also provides a macro library in its 8087 support package. However, the intent of MicroWare's macro library is different from that of other vendors' macro libraries. MicroWare's library is meant to be a source from which you can pull whatever macros you need to assemble a particular program; it is not meant to be added in its entirety to your program. Placing only the macros that are needed into a program minimizes *Masm*'s processing time.

The intent of MicroWare's macro library is clear, but the package has one hitch: The syntax and keywords of the macros are incompatible with the preprocessor. The incompatibility is apparently caused in part by MicroWare's attempt to make the macros as fast as possible. Achieving the end of greater *Masm* processing speed meant compromising the form of some of the operands. This compromise makes it difficult to switch processing modes between methods. In practice, most users will probably use the preprocessor except in unusual programming situations.

In addition to the library of 8087 instruction macros, MicroWare also provides source code for some powerful decision-making macros. These macros provide higher-level assembly language programming tools—like *if-then-else* statements and *for-next* loops—for use with the 8087. They are of special interest to serious assembly language programmers.

Also provided in the MicroWare package is an object library of transcendental functions. The library includes routines for evaluation of trigonometric, exponential, and logarithmic functions in a form suitable for linking with a user's code.

ASSEMBLY TIMES

All the products reviewed here were used to process last month's 8087 assembly language subroutine, Babbage. Recall that Babbage is a short and simple subroutine that computes a table of logarithms. The code has eighty lines (including comments) and twenty NDP statements. Processing times for the various products surveyed here are shown in table 4. The results listed are the total processing times; they include all operations involved in producing an object module from the Babbage source file.

The results in table 4 confirm our expectations about processing times: The slowest time was recorded by the most full-featured and complex macro library—SolveWare's. Faster assembly times were achieved with the simpler macro libraries from Field and Hauppauge. Significant differences between the times for these libraries are due to their different internal codings. (At the time of this writing, Seattle Computer was revising its macro library in preparation for a rerelease of the product. Seattle would not provide a current copy of its library for this review, so results for its product could not be determined.)

The big news is the performance of MicroWare's preprocessor; the preprocessor is significantly faster than the macro libraries. (The sixteen seconds of MicroWare's processing time includes seven seconds of preprocessor execution and nine seconds for *Masm*.) For serious 8087 assembly language programming projects, MicroWare's preprocessor really is the only way to use the IBM assembler and retain sanity.

SUMMARY

You need to evaluate your requirements carefully when choosing a package that provides 8087 support for the current IBM languages. In considering products for the IBM *Macro Assembler*, issues to evaluate include assembly time, mnemonic and keyword conventions, handling of the IBM-to-Intel data format translation, and, of course, cost.

Unfortunately, the current market for 8087/*Masm* products is somewhat complicated. No single product seems best suited for every user. Serious assembly language programmers probably will find MicroWare's product most valuable. Where compatibility with Intel's *Asm86* assembler is important (and processing time is not), SolveWare's macro library seems best. On the other hand, users primarily interested in 8087 support for an IBM compiler can get assembly language programming tools as a bonus by purchasing one of the attractively priced combination packages from Hauppauge or Seattle.

Next month, we'll look at the various products for IBM Basic compiler support. ▲

Field macro library	Hauppauge macro library	MicroWare preprocessor	Seattle macro library	SolveWare macro library
2:13	1:12	0:16	not available	2:41

Table 4. Sample processing times (min:sec).

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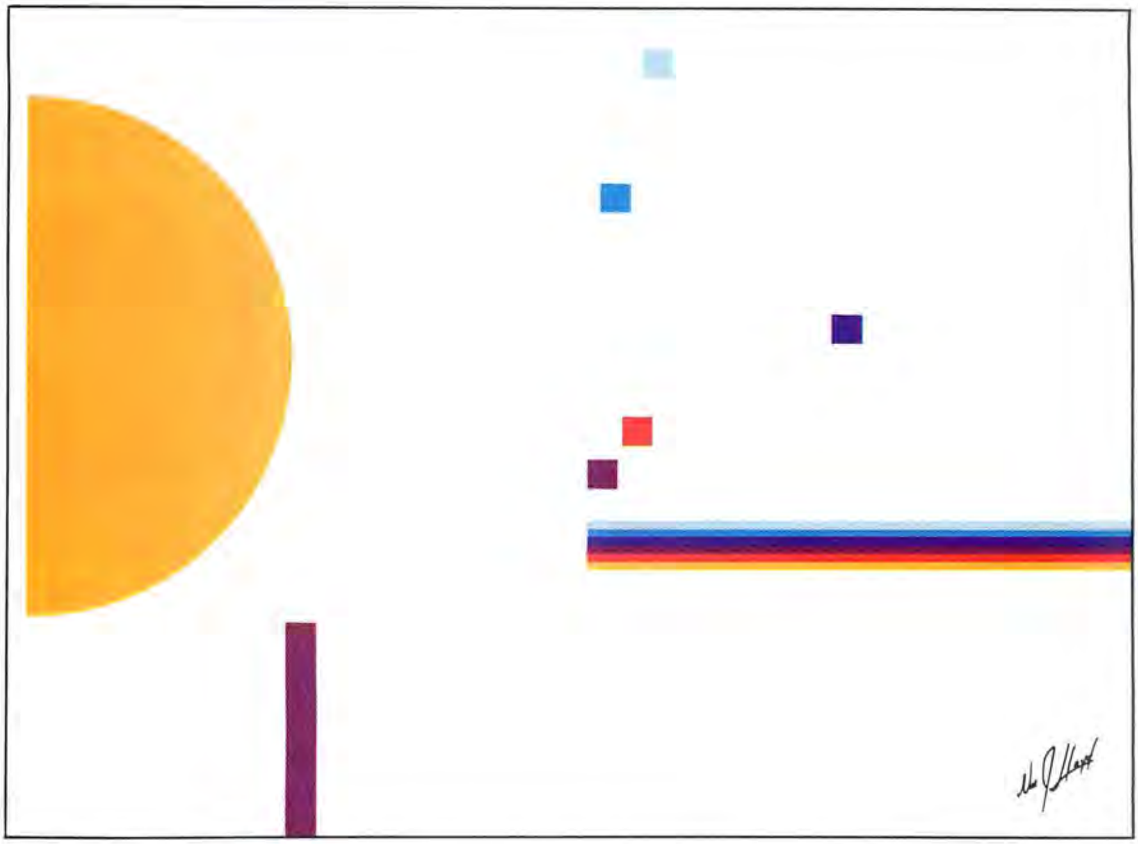

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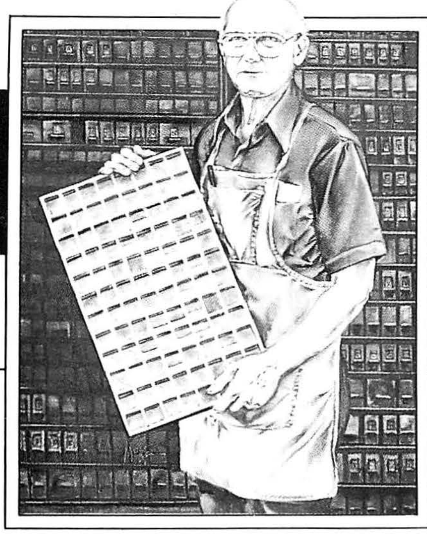

The Printed Word

by John Dickinson

The Intelligent Printer, Part VII

Last month we explored complex printer command sequences that involve variable data; these command sequences allow you to do such things as control line height and set tab stops. The *variable data* in these commands are the numbers that you provide along with the command sequences. As we have all along in this series, we used the Epson MX-80 without Graftrax as our example printer. Because of the simplicity of the Epson variable data formats (which, incidentally, are the same on all Epsons, including those made on an OEM basis for IBM and others), the MX-80 has proved to be a good model on which to learn how to access the intelligence of *your* printer—even if it's not an MX-80.

Many printer vendors have followed Epson's lead in the format they have chosen for passing variable data from computer to printer. Examples include IBM (their new Color Graphics Printer, which is not made by Epson), NEC, Texas Instruments, Star Micronics (whose printers mimic the Epsons), Okidata (some recent models), and Mannesmann-Tally. While the data format used by Epson is the simplest (and about the most popular), it is not the only way to pass a variable. Even printers that employ the same format as Epson often have features that use another format as well.

This month, we'll break away from using the Epson as exemplar and look at other methods of passing variable data.

Studying the printer manuals for a variety of makes and models can lead one to believe that there is (at least) one method for each make and model of printer; actually, however, there are only two methods in addition to the one we discussed last month. But each method—including the one used by Epson—has a variation or two associated with it.

The methods of variable passing are distinguished from one another by the formats they use for their variable data; the variations have to do with the presence and use of delimiters that mark off the beginning and end of the variable data. It goes without saying that the characters used to start complex command sequences vary from one printer to the next.

For comparison's sake, we'll start by doing a little review; we'll look a little more closely at Epson's method, and we'll learn some programming techniques for sending data to the printer in Epson's format.

The Epson printers (as we learned last month) require that you send the character whose ASCII sequence number is equal to the data value you want; for example, if you want to send a data value of 50 in a variable position, all you have to transmit is:

050

Missing an installment of "The Printed Word"? All back issues of the column—from August 1983— are still available; for further information, *see page 4.*

We'll call this method the ASCII Sequence Number (ASN) method.

The command sequence that sets the printer's horizontal tab stops is a good example of how the ASN method works, because tab stops require the sending of more than one variable value. In the ASN method, commands that involve multiple data values use a terminator value to signify the end of the variable data. The terminator most commonly used is the NUL character (ASCII sequence number 0). Some printers other than Epson that use the ASN method use a different terminator (occasionally, as in the case of the Mannesmann-Talley printers, the terminator is more than one character).

The ability to set horizontal tab stops is found in many printers, so they're a good way to demonstrate the full range of data formats. We'll use tab stops to exemplify the ASN method, and we'll continue using them as we explore the alternative variable formats

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employed by certain other printers.

To set horizontal tab stops at columns 10, 20, 30, 40, and 50, a correct sequence in BASIC for the MX-80 (and almost all Epson-compatible printers) is

```
1000 ' Epson MX-80
1010 ' Code for Setting Horizontal Tabs at 10,20,,,etc.
1020 SETHT$ = CHR$(27) + CHR$(68)
  + CHR$(10) +CHR$(20) + CHR$(30)
  + CHR$(40) + CHR$(50) + CHR$(0)
1030 LPRINT SETHT$;
```

If you check the reference card we constructed for the MX-80 in previous issues, you'll recognize the starting command sequence for horizontal tabs. The data values are constructed using BASIC's *chr$* function and the ASCII sequence number corresponding to the data values you want—just as the ASN method requires.

You can easily generalize the BASIC program above by means of a simple *for* loop:

```
1000 ' Epson MX-80
1010 ' Code for Setting Horizontal Tabs at 10,20,,,etc. in a FOR loop
1020 SETHT$ = CHR$(27) + CHR$(68)
1030 FOR TAB.STOP% = 10 TO 50 STEP 10
1040    SETHT$ = SETHT$ + CHR$(TAB.STOP%)
1050 NEXT TAB.STOP%
1060 SETHT$ = SETHT$ + CHR$(0)
1070 LPRINT SETHT$;
```

If your BASIC program required different printer tab stop settings at various points, you could turn this code into a general subroutine that used global variables within the program to control the loop. You could then call the subroutine whenever you needed to change the tab settings.

Almost as common as the ASN method is a method that requires you to send the printer one ASCII character for each digit in the data value you wish to use. Many popular printers, including the Okidata, the IDS, and the NEC matrix printers, use this method. It is not too difficult once you get the hang of it, but the documentation and examples are often confusing (and occasionally they're in hex, to make matters worse).

Because this method uses the ASCII characters for the numeric digits of your variable data, we'll call it the ASCII Character Digit (ACD) method.

Let's illustrate the ACD method with a simple example. If you needed to send a printer the number 50, you would have to send it the ASCII character for each digit—in other words, the ASCII character for "5", followed by the ASCII character for "0".

```
053 048
```

If you check Appendix G of your BASIC manual (or any other ASCII table), you'll find that the decimal digits (0 through 9) start with ASCII sequence number 48 (for 0) and go through ASCII 57 (for 9). Thus 053 048 is the correct sequence for the characters "5" and "0".

If you want to prove to yourself that these values are correct, type the following into BASIC:

```
PRINT CHR$(53) + CHR$(48)
```

and watch *50* appear on your screen.

Because the values sent in the ACD method represent decimal digits, they may not be less than 48 or greater than 57 (that is, they can't represent any characters before "0" or after "9"). (On a very few printers—the NEC 7700 comes to mind—the values represent hexadecimal numbers, so this range would be different.) But the range of ASCII values that make sense in the ACD method is not necessarily the same as the range of acceptable values for the printer parameter you are setting. You'll have to look elsewhere in the printer manual to find the limits for each printer parameter

(see April's "Printed Word" for details on printer parameter limits).

Additional characteristics are usually associated with the ACD method. One is that the number of character digits per variable is fixed at two, three, or four. On some printers you don't have to use the fixed number, but it's good practice to do so; printer programs sometimes have bugs, and a conservative approach is safest. Another characteristic is that a delimiter (usually a comma or semicolon) may be required between the variables when multiple values are sent (sometimes it is required before and/or after the variables start as well); a terminator— usually a period—is sometimes also required. Complex command sequences using the ACD method that require only one value do not usually require any sort of delimiter or terminator.

Let's try setting horizontal tabs to 10, 20, 30, 40, and 50, using the ACD method. We'll have to send a few more characters than we did earlier when we were using the ASN method.

Here's how you would do it on the Okidata Microline 92/93:

```
1000 ' Okidata Microline 92/93
1010 ' Code for Setting Horizontal Tabs at 10,20,,,etc.
1020 SETHT$ = CHR$(27) + CHR$(9)
   + CHR$(48) + CHR$(49) + CHR$(48) + CHR$(44)
   + CHR$(48) + CHR$(50) + CHR$(48) + CHR$(44)
   + CHR$(48) + CHR$(51) + CHR$(48) + CHR$(44)
   + CHR$(48) + CHR$(52) + CHR$(48) + CHR$(44)
   + CHR$(48) + CHR$(53) + CHR$(48)
   + CHR$(13)
1030 LPRINT SETHT$;
```

Several things are worth noting here. The Okidata requires a fixed format of three characters per value loaded (this is fixed, but it may be variable on your printer). Where the value specified has fewer than three digits, a leading 0 (048) is added to make up the extra character. Each value, except the last one, is delimited by a comma (ASCII sequence number 44). The Okidata requires a carriage return character (013) as a terminator value following the last character transmitted to the printer.

Generalizing the method by using a BASIC *for* loop is a little trickier for the ACD method than for ASN—but far from impossible. The most important thing to remember is to use BASIC's *str$* function correctly to convert numbers to their character format and the *mid$* function to parse (strip out) the characters needed. One thing that trips some people up in this situation is the fact that BASIC always adds a leading blank to positive numbers converted to strings via *str$*. You have to remove this leading blank (use the *right$* and *len* functions).

The following program should get the desired results (note the comments on the trickier lines of code):

```
1000 ' Okidata Microline 92/93
1010 ' Code for setting horizontal tabs at 10,20,,,etc. in a
FOR loop
1020 SETHT$ = CHR$(27) + CHR$(9)
1030 FOR TAB.STOP% = 10 TO 50 STEP 10
1040    TAB.CHAR$ = STR$(TAB.STOP%)    'Convert to
string
1050    TAB.CHAR$ =
RIGHT$(TAB.CHAR$,LEN(TAB.CHAR$) - 1) 'Strip
leading blank
1060       WHILE LEN(TAB.CHAR$) < 3
1070 TAB.CHAR$ = CHR$(48) + TAB.CHAR$    'Add
leading zeros
1080       WEND
1090    SETHT$ = SETHT$ + TAB.CHAR$
1100    IF TAB.STOP% <> 50 THEN SETHT$ = SETHT$
 + CHR$(44)
   ELSE SETHT$ = SETHT$ + CHR$(13)   'Add comma
   or CR
   1110 NEXT TAB.STOP%
   1120 LPRINT SETHT$;
```

Once again, here's a program you can generalize into a subroutine that your larger program can call whenever horizontal tab requirements change.

If you have a model other than the Okidata that uses the ACD method, be sure to note the use (or nonuse) of delimiters and terminators. Also be sure to use the correct leading command sequence to start things off when setting tabs (or whatever else on your printer requires the ACD method).

The last method for formatting variables that we'll cover this month requires that you send the printer a number of spaces corresponding to the number of the variable you are describing, followed by a command sequence to set the printer's parameter. This method is usually associated with printers of older design (such as the Smith-Corona TP-1), that are based on typewriter mechanisms. Such printers require you to move the carriage to the position of the option setting (the desired horizontal tab stop or margin, for example), and then set the option. In other words, they have to be operated just the way you would operate one of their typewriter ancestors.

This can mean that, when multiple values are needed, you have to send the number of spaces corresponding to the difference between data values. And you'll need to experiment with your printer to discover whether it needs to have *exactly* the difference, or *one less than* the difference. It's not always clear from the documentation.

Surprisingly, many newer designs use this method for some of their variables, although most of them don't actually have you

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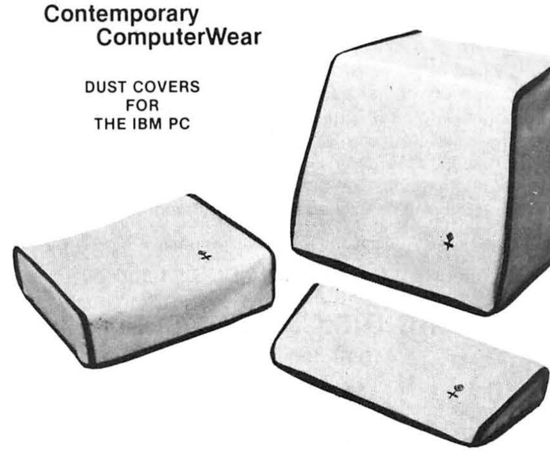

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move the printer mechanism around to set the parameters. Two popular examples are the Okidata Microline 82/83, 84, and 92/93 (vertical format unit tabs) and the NEC 3550 (left and right margins). In a variation occasionally found (the Diablo 360 is an example), the printer requires you to send line feeds (ASCII sequence number 10) instead of spaces (032). Usually, this variation appears in commands for setting vertical tab stops or some other vertical parameter, such as top or bottom margin.

Sometimes the documentation obscures the fact that this method is the one you should be using. If your printer manual describes a command sequence's job as "setting the XYZ at the current position," this is the method you need. Confusing though it may be, this description gives us a good name for the method. We'll call it the Space-to-Position (STP) method, since, whether the spaces are horizontal or vertical, that's what you have to do to send your variable data (no Andy Granatelli jokes out there, please).

Before you space to the position where you want to set the option, you need to be sure of where you are. Most printers using the STP method employ command sequences that are relatively dumb and put most of the burden of setting the option on you. It's best if you ascertain where you are starting, then space to the position and set the option. In the case of horizontal options, such as margins and tabs, all you have to do is send a carriage return (CR) command sequence to be sure the carriage is at the left margin; and in the case of vertical options, you need to issue a form feed command sequence to be sure you're at the top of the printer form. Then you can get down to the business of inserting STP's spaces.

We'll continue with our horizontal-tab-setting example (once again setting them at 10, 20, 30, and so on), and this time we'll use the Smith-Corona TP-1's command sequence as a model. The TP-1 uses a one-character command sequence (018) for setting tabs, and the following program inserts the carriage return, as recommended above:

```
1000 ' Smith-Corona TP-1
1010 ' Code for setting horizontal tabs at 10,20,,,etc.
1020 SETHT$ = CHR$(13)'Carriage return to set up
1030 SETHT$ = SETHT$ + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(18)
1040 SETHT$ = SETHT$ + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(18)
1050 SETHT$ = SETHT$ + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(18)
1060 SETHT$ = SETHT$ + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(18)
1070 SETHT$ = SETHT$ + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(32) + CHR$(32) + CHR$(32) + CHR$(32)
   + CHR$(18)
1080 LPRINT SETHT$;
```

Even BASIC's most ardent admirers will have to admit that this is quite lot of code just to perform a simple task. It has to be split into several lines in order to comply with BASIC's 255-character-per-line limit.

Can this program be generalized? Actually, it's easier to generalize with this method than with ACD, since you don't have to parse character strings, strip out blanks, and so on. The following ought to do the trick:

```
1000 ' Smith-Corona TP-1
1010 ' Code for setting horizontal tabs at 10,20,,etc. with
a FOR loop
1020 SETHT$ = CHR$(13)
1030 FOR TAB.STOP% = 10 TO 50 STEP 10
1040    FOR SPACES% = 1 TO 10
1050       SETHT$ = SETHT$ + CHR$(32)
1060    NEXT SPACES%
1070    SETHT$ = SETHT$ + CHR$(18)
1080 NEXT TAB.STOP%
1090 LPRINT SETHT$;
```

Like the other program examples, this one can be made as general as you want it to be; and it can be called as a subroutine wherever it's needed.

We've been using BASIC to demonstrate the more advanced features of your printer because these features are all accessible from BASIC. Many software packages offer some level of support for the more commonly available printer features, such as print enhancement, character fonts (including special word processing options), and vertical and horizontal formatting.

Next month we'll take up some of the more popular packages. Word processing is the obvious place to start (after all, printing words is a word processing program's primary purpose), and we'll take a month or two to cover some of the better printer interfaces available. We'll move on to spreadsheet programs from there and will happily take any of your suggestions for other types of software you'd like to see explored for printer intelligence support.

See you next month. ▲

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Volume II Issue XII May 1984 Softalk

Ashton-Tate Introduces 'Framework'

BY JOHN DICKINSON

NEW YORK—"We decided that Ashton-Tate had to participate as the software balance of power shifted from those users who understand computers to those who need them."

Thus David Cole, president of Ashton-Tate, described the business objective his company set for itself in 1982 and the motivation behind a project code-named "Fred." On March 28, at the plush Helmsley Palace Hotel, "Fred" was revealed to securities analysts and the press.

Fred's real name is *Framework*. Ashton-Tate has met its objective.

In what can only be described as a quantum leap for a company that has lived so long on the success of a highly technical product (*dBase II*), Ashton-Tate has produced a multifunction, user-oriented product combining data management, spreadsheet analysis, graphics, and word processing in an easy-to-use window environment (Ashton-Tate calls its windows "frames").

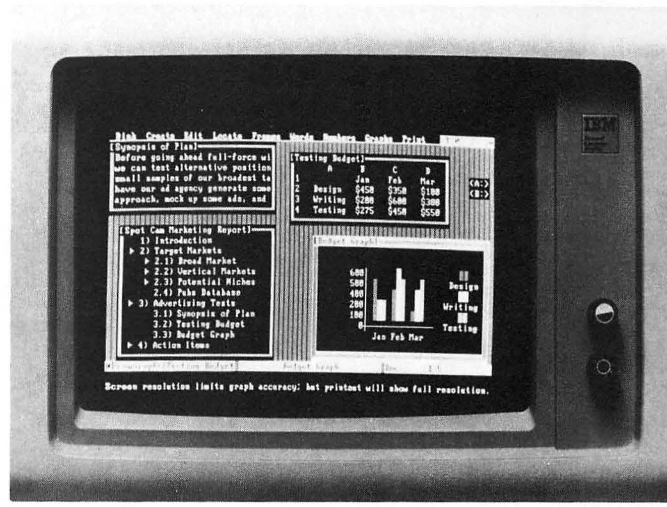
The fact that *Framework* is a window environment puts Ashton-Tate in step with what is quickly evolving as an industry standard for multifunction products. But *Framework* takes a couple of significant departures from the other windowing systems that have been offered (or at any rate announced) to date.

The most obvious departure is that *Framework* works on an IBM monochrome display, as well as on a color/graphics display; its on-screen graphics functions don't require a graphics card. *Framework* uses the PC's block-graphic character set, along with more traditional characters, to provide various kinds of graphs on monochrome screens. Earlier systems (including the most recently announced ones) rely on the slower-moving graphics screen to do their window zooming and overlaying.

Another unique aspect of *Framework* is its desktop-organizer approach. The program uses the simple and familiar construct of a project outline to help users organize their information-processing tasks into groups and subgroups of whatever variety they choose. Information sources and destinations as well as analytical techniques (graphics, spreadsheet, text, and so on) can be mixed or matched as the user requires. The outline can be added to and reorganized as needs change, and *Framework* functions move right along with such changes.

In a semideparture from "tradition," *Framework* shuns the mouse interface. The user points to desired menu items with the PC's cursor keys ("We'll look at mice if they ever become a serious factor in the industry," said Cole) and issues most commands with function keys. In this respect *Framework* is different from VisiOn, Microsoft Windows, and other windowing environments, although not altogether different from *1-2-3*.

The program is impressive in the consistency of its command structure; the same keys



provide similar functionality in all areas of the system. For example, the key to move data works for text in the word processor, data cells in the spreadsheet or database, and even in the outline organizer that sits on top of everything. The user has to learn *Framework*'s commands only once, and then can apply them to every aspect of the system.

Framework's spreadsheet, which gives you the option of performing calculations by citing names of rows and columns instead of numbers and letters, works (according to Ashton-Tate) faster than either *1-2-3* or *VisiCalc*. The database defines file organization and fields by way of menus but requires commands for the selection and sorting of data. All of *Framework*'s features appear to be powerful and easy to use.

Framework includes a full-function programming language that has retained the nickname "Fred." Ashton-Tate has declined to say why it didn't use *dBase II*'s language or why the world needs yet another programming language, but Fred is powerful (it has 140 functions and commands) and can be used within any of *Framework*'s functions. As a demonstration of the power of this language, Ashton-Tate's demo (which was presented by chief designer Robert Carr) included a spreadsheet model programmed to beep and flash when profit margins fell below a threshold.

Since *Framework* does all its work on data in RAM, the system's capacities will be limited by the amount of that commodity installed in a user's PC. *Framework* requires 256K or more (and two disk drives or a hard disk), but it's not clear just what amount of data a 256K system will hold. For example, Carr stated that 3,000 records was the maximum practical size for a typical *Framework* database file, but he didn't say how much memory

GOTO *page 139, column 2*

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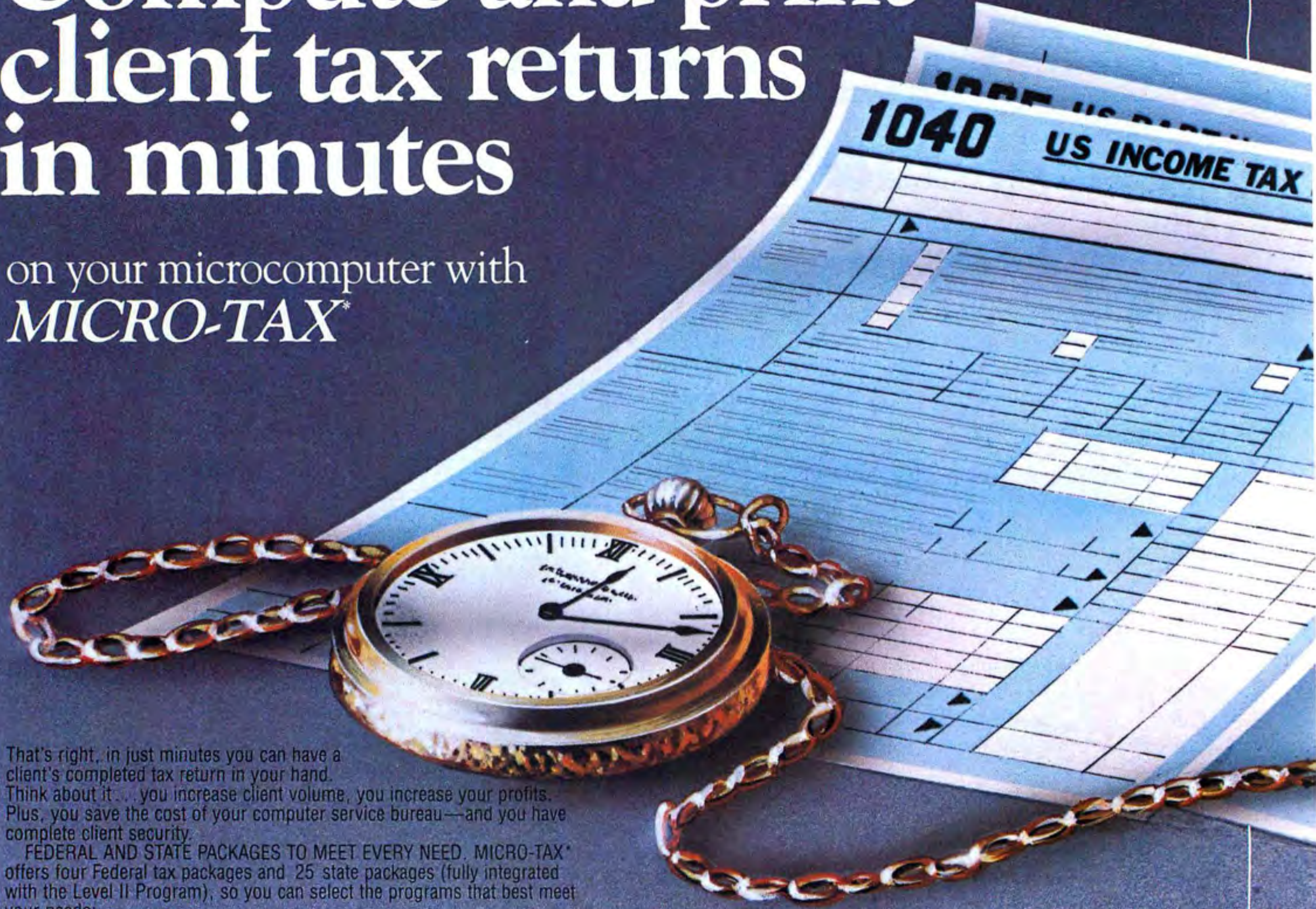

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IBM Integrates OA Strategy

NEW YORK—At a press conference here on April 3, amidst a flurry of new PC-related product announcements, IBM introduced a new concept in its application software strategy.

The concept is *connectivity*.

What's that? Connectivity means a bonding of things together, and what IBM is trying to do is tie its office automation product line, which spans a wide variety of mini- and microcomputer hardware products, into an integrated whole.

How are they doing that? By porting IBM successful office automation products to their own most popular business microcomputer—the PC.

IBM's current line of office products runs on several different computers and therefore spans several divisions of the corporation; all those divisions were represented at this press conference. Senior IBM players included Philip (Don) Estridge and Douglas R. LeGrande, both of the Entry Systems Division; Bob Murphy, General and Office Systems; and H. Mitchell Watson, Jr., Systems Products Division. All four reaffirmed IBM's commitment to integrating its office automation strategy across the entire IBM line of hardware products.

The first step in this direction is an implementation for the PC of the popular IBM *DisplayWriter* word processing package. Two versions for the PC family, both called *DisplayWrite*, were announced.

DisplayWrite 1, a minimum-featured version priced at $95, is available for enhanced PC*jrs* (the ones with 128K and a disk drive). The full-featured version, *DisplayWrite 2*, sells for $299 and is available for PCs with 128K and two disk drives, XTs, 3270-PCs, and PC Portables. *DisplayWrite 2* offers a 100,000-word spelling checker (with provision for a user-supplied supplement) and a mail-merge facility. *DisplayWrite 2* includes everything that comes with the standalone DisplayWriter.

Both products feature data transferability between fellow PCs and, perhaps more important, between PCs and standalone DisplayWriter machines. Disks created on a PC (or Junior) in either version of *DisplayWrite* can be read on a DisplayWriter.

DisplayWrite 2 can be further enhanced by the addition of *DisplayComm BSC*, a bisynchronous communication software support package that allows transfer of edited documents or plain ASCII files across IBM's recently announced DISOSS office communications network protocol. An additional option is the *DisplayWrite* legal support package, which provides a specialized supplemental spelling checker containing 16,000 legal terms. *DisplayComm BSC* carries a $375 price tag; the legal support will go for $165. Also announced was a version of *PCWriter*, another successful IBM word processor that currently runs on IBM's 5520 administrative system and the System/23 Datamaster.

The only PC-related hardware product announced by IBM was a new color display for the PC*jr*. IBM is touting this $429 unit as a "low-cost monitor for the most affordable computer." The monitor has sound capability (you can use its speaker or connect an earphone) and provides sufficient resolution to take advantage of Junior's enhanced color graphics. The styling of the new monitor's case closely matches Junior's own unique look.

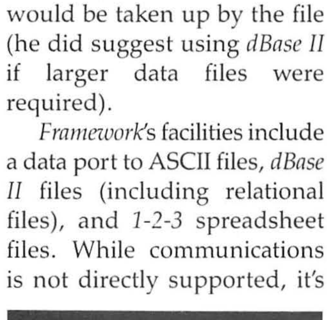
Also announced was a very small and attractively priced new lineup of IBM's popular System/36 minicomputer. ▲

Ashton-Tate's 'Framework'

continued from page 137

would be taken up by the file (he did suggest using *dBase II* if larger data files were required).

Framework's facilities include a data port to ASCII files, *dBase II* files (including relational files), and *1-2-3* spreadsheet files. While communications is not directly supported, it's



possible to export a file (to an ASCII file, for example) and communicate it; *Framework*'s version of the DOS shell facility lets you run other DOS programs from within the *Framework* environment.

Framework will inevitably be compared to Lotus's recently announced *Symphony*. Judging by the demos, the two systems look like equally impressive tools for the middle manager whose personal computer needs have up till now required a variety of separate programs. Since both systems will be available at the same price ($695), they seem roughly comparable on a price-per-function basis.

A serious comparison of *Symphony* and *Framework* will, of course, require hands-on testing. And for that, we'll all have to wait. Both systems are scheduled for a midyear release, but neither has yet been beta tested.

Regardless of *Framework*'s merits and shortcomings relative to *Symphony* (and whatever else comes along), Ashton-Tate has a long row to hoe in the marketplace.

Middle managers are invariably the target market for a multifunction product. Lotus Development has a strong following among its one hundred ten thousand middle-management *1-2-3* users and is offering those users a deep discount to ease their transition to *Symphony*. Ashton-Tate has a strong following among the (no one knows how many) consultants who have reaped the benefits of the powerful, but complicated, *dBase II*; these consultants have for years been developing *dBase II* systems for many of those same middle managers. However, among end users, Ashton-Tate has something of an image problem.

But the company is aware of the problem and is doing something about it. At the *Framework* debut, they announced an eighteen-month, multicity, multimedia, multidealer promotion blitz that will include advertising, in-city presentations, and training for both salespeople and *Framework* prospects. They've also arranged for several software developers to build off-the-shelf specialty applications for various industries, using *Framework* and Fred.

If they overcome their image problem, Ashton-Tate could emerge as one of the real winners in the sure-to-come software industry shakeout of the next few years. ▲

Test Yourself...

20 BASIC (and not so basic) QUESTIONS

J. Edward Volkstorf, Jr.

How are you at BASIC trivia?

Test your knowledge of interpretive BASIC on the IBM PC with the following quiz. Each question concerns some possibly useful, possibly useless, aspect of the language. The answers are at the end of this article.

1 A blank formatted single-sided disk is inserted in drive A. An *open* for a random disk file is then executed:

OPEN "A:TEST.DAT" AS 1

The statement *get 1,1254* works okay, but *put 1,1254* causes an error. What's wrong?

2 A sequential file has been opened as file number 1. A large amount of data is written to it via statements of the form *print #1,X*. After the file is closed, it is reopened and there is nothing in the file. No errors occurred during either the input or the output phase. So why is there nothing in the file?

3 The expression

N% MOD 10

can be written as

N% – (N%\10) * 10

where N% is any arbitrary integer. There's a third way to write this expression that doesn't use any arithmetic operators. What is it?

4 The variables R and C are both in the range of 1 to 25, yet the statement sequence *locate r,c : print chr$(1)* causes an error. What kind of error might it be, and why might it occur?

5 The function *screen(r,c)* retrieves the ASCII code of the character located at screen row R, column C. After the screen has been cleared with a *cls*, the statement

A = SCREEN(12,13)

usually returns a 32—meaning a blank space. When does it not?

6 When might the statement *line input X$* cause an error?

7 What does the following expression do?

N% = X% * ((X%<0) – (X%>0))

8 Converting an integer such as N% to the two bytes that make it up can be done with code such as:

B0 = N% MOD 256 : B1 = N% \ 256

where B0 is the first byte and B1 the second byte of N%. This code fails, however, when N% is a negative integer. How would you rewrite these expressions to determine correctly the values of the two bytes?

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9 How might you revise your answer to question 8 and calculate the values for B0 and B1 without using any arithmetic operators?

10 How would you code the loop:
100 C$ = INKEY$: IF C$ = "" THEN GOTO 100
without using the *if-then* and *goto* constructs?

11 How can you enter a negative number in response to a statement such as *input* X without using a minus sign?

12 How could you multiply the variable N% by 1,000 without using the multiplication operator (*)?

13 Assume C$ to be a single alphanumeric character. Without using *then*, how would you convert C$ to upper case when and only when it's a lowercase character?

14 The statement *locate ,,,3,4* turns on the cursor scan lines 3 and 4, causing the cursor to be a dash (or minus sign). When does this statement not work?

15 How can you check to see if the numeric variable X is not 0, without using the logical expression X <> 0?

16 How might you write a BASIC program that accepts input from a user and then inserts that input as a subroutine into the program? (In other words, how might a program modify itself dynamically, in accordance with user input?)

17 You have a table of 100 unique integers. Using two instructions, how can you find out whether—and at what position (from 1 to 100)—some specific integer is included in the table?

18 BASIC statements are limited to 255 characters (including the enter or carriage return). How can you write a line of BASIC code that, when listed, will be longer than 255 characters?

19 How can you mimic the *int* function (strip a number of its fractional component) without using any arithmetic operators?

20 Using a statement of the following form:
ON KEY(1) GOSUB 1200 :
KEY(1) ON
a program sets function key 1 to trap to line 1200. There is one circumstance, however, when the program doesn't immediately trap the key. Why not?

ANSWERS

1 Unless another size is specifically stated, the random disk record buffer size defaults to 128 bytes. When you execute a *put*, all records up to and including the one referenced must exist. The record number 1254 times the buffer size 128 equals 160,768, which exceeds the capacity of the floppy disk and causes a disk-full error.

On the other hand, a *get* to some nonexistent record number, such as 1254, causes BASIC to return a string of ASCII null characters. No error is reported.

2 The file was initially opened for input when the *print* statements were executed. Unfortunately, BASIC does not report an error when output is sent to a file opened for input.

3 Convert N% to a string and get the rightmost character:
D% = VAL(RIGHT$(STR$(N%),1))

4 If the twenty-fifth line of the screen is being displayed via a *key on* statement, then any attempt to access that line causes an illegal function call error.

5 If the screen is being processed in one of the graphics modes, *screen 1* or *screen 2* (or 1 to 7 for the PC*jr*'s cartridge BASIC), then the *screen* function returns a 0 for a blank position instead of a 32. Incidentally, in character text mode, line 25 of the screen also returns a 0 after it has been blanked by a *key off* statement.

6 This can happen when there is insufficient memory to accommodate the string value being input; the error message is "Out of memory."

7 This expression is the "hard way" to take the absolute value of X%.

8 Use the *and* operator for the first byte, and, if N% is negative, add 255 to the second byte. The following code will do:
B0 = N% AND 255
B1 = N%\256
IF N% < 0 THEN B1 = B1 + 255

9 Convert N% to its two-character binary coded form, using the *mki$* function, and extract each byte as an ASCII

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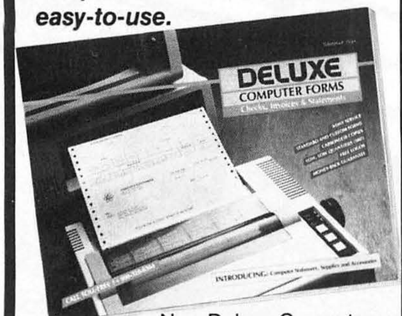

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character code, like this:

```
C$ = MKI$(N%)
B0 = ASC(RIGHT$(C$,1))
B1 = ASC(LEFT$(C$,1))
```

10 Use the *while-wend* loop, as follows:

```
100 C$ = "" : WHILE C$ = "" :
C$ = INKEY$ : WEND
```

11 You can use hex or octal notation. The BASIC interpreter will treat your input as signed two's complement values. So, for instance, you could express –1 as &HFFFF or &O177777.

12 You could convert the number to a string, concatenate a string of three zeros on the right side of it, and then reconvert it to a number:

```
N = VAL (STR$(N)+"000")
```

13 Use the expression:

```
C$ = CHR$(ASC(C$) + (C$ >=
"a" AND C$ <= "z") * 32)
```

14 It doesn't work when in any of the graphics modes the cursor is controlled in a different manner than it is in character mode. The *locate* statement has no effect on the cursor's shape.

15 BASIC's *if-then* construct evaluates a zero value in a numeric variable as false and any nonzero value as true. Therefore, a simple *if X* test, such as:

```
IF X THEN PRINT "Number is not
zero"
```

will do the job.

16 *Line input* the user's statement; tack on a line number to the front of it and a *: return* at the end. Then write the line to a sequential file, close the file, and *merge* it back into the program.

```
100 LINE INPUT "Your statement: ",
    ST$
110 OPEN "SUBRT.BAS" AS 1
120 PRINT #1, "1000 " + ST$ + " :
    RETURN "
130 CLOSE 1
140 MERGE "SUBRT.BAS"
```

Afterward, you could do a *gosub 1000* to process the statement entered. With an *on error goto* statement added to your code, you could also report to the user any problems found in his statement (unless, of course, your user gave you an *end* or *stop* statement).

17 First, use the *mki$* function to set up the table as a string of binary-coded integers. Then look up the binary string value of the number with the *instr* function. If the value returned is odd, then the number has been found; to determine the relative position, divide the *instr* value by 2 and add 1. If *instr* returns a 0 or other even number, then the number you're looking for is not in the table.

For example, the following code creates a table of the integers 1 to 100 in the string Tbl$:

```
100 TBL$ = ""           'init TBL$ to
                         null
110 FOR I% =            'loop through
    1 TO 100             each number
120 TBL$ = TBL$         'add I% to table
    + MKI$(I%)
130 NEXT I%
```

Now to find out if a value is in the table, use the following:

```
200 INPUT "Enter a number: ",N%
210 P% = INSTR(TBL$,MKI$(N%))
220 IF P% = 0 OR
    (P% MOD 2) = 0
    THEN PRINT "Not in table" :
    GOTO 200
230 PRINT "Number is in table at
    position "(P%\2) + 1
```

This principle can also be applied to lookups of single-precision and double-precision numbers.

18 Let *:?* be the last two characters in a BASIC line of 254 characters. When you list the line, the question mark will be converted to the word *print*, increasing the line length to 258 characters.

19 Convert the number to a string, find the decimal point, then return all digits to the left of the decimal point:

```
N = VAL (LEFT$ (STR$ (M),INSTR
(STR$ (M) + ".",".") -1))
```

Note that you have to concatenate a "." to Str$(M) to ensure that *instr* will return a nonzero value.

20 BASIC checks to see if a trapped key has been pressed *after* it processes each statement in the program. When a program is in an input state (while it's processing an *input$* function or an *input* statement), the press of a trapped key will not result in a trap until the input is complete.

So how'd you do?

Consider yourself a BASIC expert if you got 18 or more; consider yourself good at BASIC if you made 14 to 17. If you scored between 5 and 13, think of yourself as an average BASIC programmer; if you don't fall into any of those categories, give some thought to learning Logo.

Admittedly, some of the questions are a little off the wall, but if you had fun trying to figure them out and learned anything new along the way, then score yourself a 100! ▲

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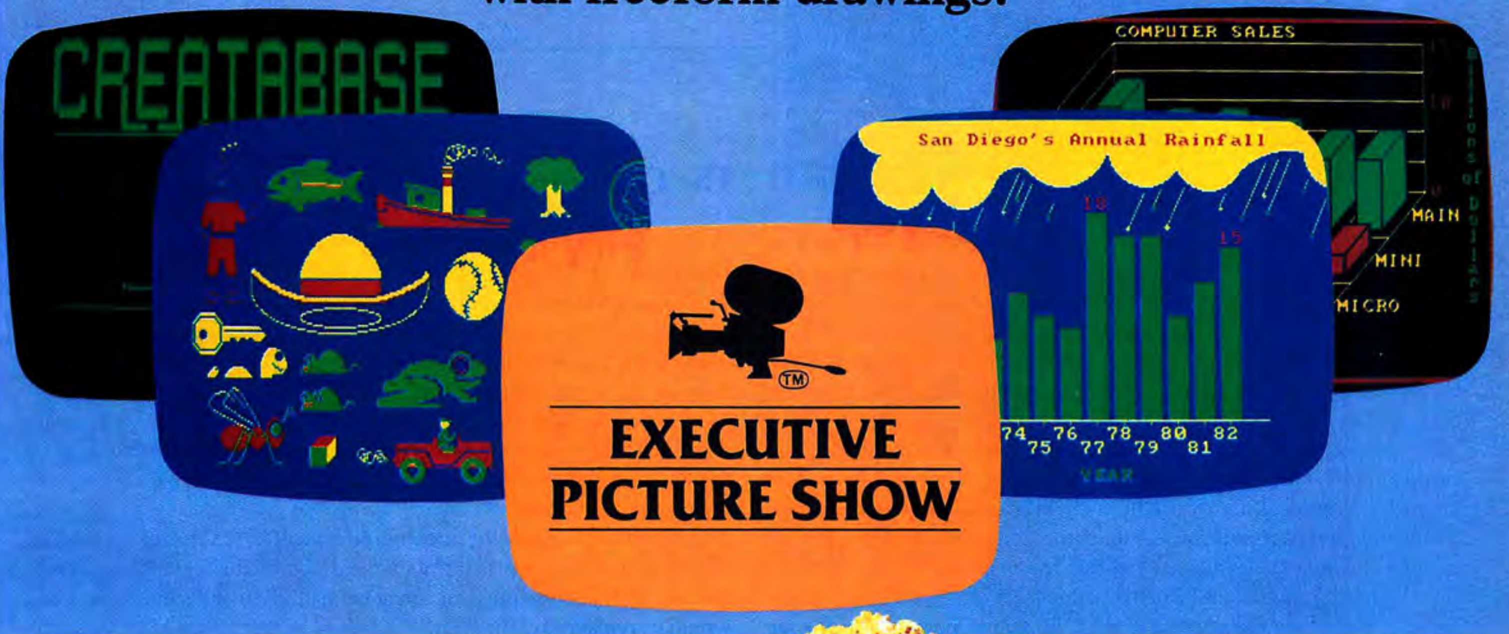

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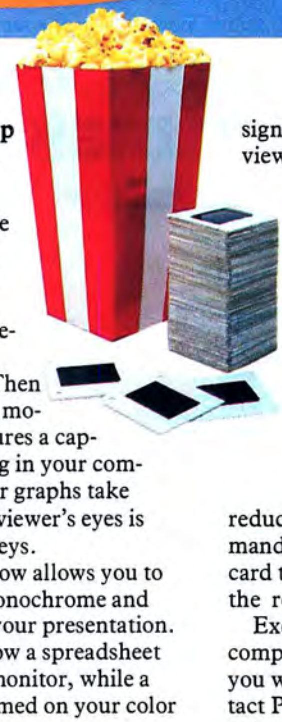

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THE C SPOT

by Rex Jaeschke

The C Preprocessor

In recent months we have seen examples of the preprocessor directives *#define* and *#include*. So far, discussion of these directives has been limited to an explanation of their use, along with some simple examples. This time we'll examine these two preprocessor directives in more detail and introduce the other directives.

The preprocessor is a routine that scans a C source file, looking for lines beginning with a number sign (#) (naturally, number signs occurring within comments are ignored). Such lines are assumed to be directives to the preprocessor, indicating some action to be taken before subsequent source code lines are handed to the compiler.

Although Kernighan and Ritchie define a set of preprocessor directives, the preprocessor is *not* part of the C language. Fortunately, the set of directives they recommend is implemented in almost all commercial compilers.

Defining Macros. C is one of the few high-level languages that have good macro processors. As assembly language programmers know, macros are essential to large-scale low-level programming projects. They're also invaluable in C.

A *macro* is shorthand for a piece of code. The abbreviated version is expanded when the code is assembled or compiled. An advantage of the C preprocessor is that it doesn't require macros to be complete C language constructs.

In February, we saw the directive *#define EOF −1*. Here, the symbol EOF was assigned the string value −1. Once this symbol had been defined, every subsequent occurrence of EOF in the same source file would be replaced by the string −1 before being processed by the compiler. Compile-time symbols have several purposes. By allowing the assignment of meaningful names to constants, they document the code. Their use can reduce the size of source code files and the time it takes to create them. They help make the routine portable by isolating compiler-implementation dependencies (on some systems, the end-of-file flag is not −1; without a symbolic constant such as EOF, transporting an existing program from one system to another would require the replacement of all relevant occurrences of −1).

Here are some simple examples of macros.

```
#define NULL '\0'              /* the ascii nul */
#define BELL 7                 /* the bell char */
#define BS '\b'                /* the backspace char */
#define TAB '\t'               /* the tab char */
#define EOS '\0'               /* end-of-string terminator */
#define NL putchar ('\n')      /* print new-line to standard output */
#define PI 3.1415926           /* value of pi */
#define CTRL_C 3               /* control-C char */
#define F10 68                 /* F10 key scan code */
#define C_HOME 119             /* control-home key scan code */
```

Macro names have the same format as variable names, but they usually are written in upper case so that they stand out. As we shall see later, there's a good reason to give certain macros lowercase names. Don't give a macro and a variable the same name; if you do, the preprocessor will interpret a reference to the variable as a reference to the macro.

When defining a macro to contain a whole or trailing part of a C statement (see NL above), it's a good idea not to include the statement-terminating colon in the definition. That way you can write *NL;*, which looks more like a C statement, in the code. Since preprocessor directives aren't part of the C language, they don't need to end with a semicolon.

You can use macros to customize your programs, as follows:

```
#define then               /* add a dummy keyword then */
        if (condition) then
```


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- Any size record length

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- Print text on monitor
- Switch monitors
- Transfer text between monitors
- Highlight a section of screen
- Return a character & attribute code
- Clear to End Of Line
- Clear to End Of Screen

STRING HANDLING SUBROUTINES:
- Sort array in memory
- Convert to uppercase
- Convert to lowercase
- Strip spaces from front
- Strip spaces from end
- Print using to string

MISCELLANEOUS SUBROUTINES
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- Unpack a RADIX to ASCII
- Convert string to SOUNDEX key
- Get status of SHIFT, CONTROL, NUM-LOC etc.
- Set status of SHIFT, CONTROL, NUM-LOC etc.
- Determine number of days between dates
- Determine the day of the week
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```
    ...
#define proc {              /* define a begin procedure keyword */
#define endproc }           /* and an end procedure keyword */
        while (condition)
                proc
                        ...
                endproc
```

You can redefine macros at any time by assigning new values to them with a *#define* directive. Macro definitions also can refer to previously defined macros.

```
#define SYMBOL 123
#define START 2
#define END 24
#define RANGE END - START + 1
#define SYMBOL 456          /* redefine SYMBOL */
```

You can make a common set of statements into a macro in the following way (note that the trailing semicolon is missing):

```
#define GETKEY printf ("Please press any key. "); c = getchar ()
```

GETKEY; causes the macro to expand to a valid C construct.

Sometimes certain limits or values are unknown or may vary once the programming of a project has been started. If you have defined these limits as macros, it will be easy to change them later on without otherwise affecting the programs.

```
#define NAMELEN 30          /* set max length of name */
#define MAXPAIRS 100        /* define max number of value pairs */
        char name[NAMELEN+1];   /* add extra char for
                                   null terminator */
        int value1[MAXPAIRS];
        int value2[MAXPAIRS];
```

Consider the following macro definition and use.

```
#define DIFF x2 - x1
        y = DIFF * 10;
```

Because the multiplication sign has higher precedence than the minus sign, this expression would be evaluated as *y = x2 − (x1 * 10);*. To force *y = (x2 − x1) * 10;*, you should define the macro as *#define DIFF (x2 − x1)*. This type of error can be difficult to find, so be careful when defining macros that contain such expressions. It would be handy for debugging purposes if the C preprocessor could list macro expansions; unfortunately, it cannot.

Like assembler macros, C preprocessor macros can have arguments.

```
#define isdigit(c) ((c) >= '0' && (c) <= '9')
#define islower(c) ((c) >= 'a' && (c) <= 'z')
#define TRACEMSG(s) printf ("TRACE entered function %s.\n",s)

sub1 ()
{
        TRACEMSG("sub1");
        if (isdigit(i))
                ...
        if (islower(ch + m - k)
                ...
}
```

The macro *isdigit* has one dummy argument, *c*. When *isdigit* is referenced with an actual argument of *i*, each occurrence of *c* in the macro is replaced with *i*. Likewise, in *islower*, *c* is replaced by *ch + m − k*. The dummy arguments are merely placeholders that indicate where actual arguments are to be substituted. Dummy arguments in one macro can have the same name as dummy arguments in another; the dummy arguments may also have the same names as program variables.

A macro's assigned value begins with the first nonblank character following the blank after the macro name. This means that macro definitions containing dummy arguments *cannot* have a space between the macro name and the opening parenthesis. *#define A (c) putchar(c)* would cause the string "(c) putchar(c)" to be assigned to the macro *A*. As defined in this manner, *A* has no dummy argument; the preprocessor would then expand *A(x);* to *(c) putchar(c)(x);* instead of to *putchar(x);*. The correct definition is *#define A(c) putchar(c).*

When the *TRACEMSG* macro is expanded, the *s* in *%s* is not expanded. The macro processor ignores character constants and the contents of literal strings when searching for dummy arguments to replace.

Simple sequences of code such as *isdigit* and *islower* can be defined as in-line macros rather than as functions. This eliminates the overhead of a function call, at the expense of duplicating the macro expansion in-line, once for each such macro reference. Note that these two macros have lowercase names. This allows a source-code file to ignore whether they are macros or functions. Later, the programmer can change from a function to a macro or vice versa without having to change executable code statements, as would be required if *ISLOWER* and *ISDIGIT* were the macro names.

Long *#define* directives can span more than one line; a backslash at the end of a line means "to be continued on next line."

Removing Macro Definitions. Once a macro has been defined, its definition holds for the rest of that source file—unless you redefine the macro or remove it from the preprocessor symbol table. You can remove symbols by using the *#undef* directive, as follows:

```
#define HIGH 1000
#undef HIGH
```

Each compiler's preprocessor symbol table imposes some limit on the number of macro definitions it will allow and on the total string size to which the macros can be expanded. Therefore, a program that has many macros, particularly large ones, may cause the symbol table to overflow. To prevent this from happening, you can remove macros once they're no longer needed, thereby making room for new definitions.

Header Files. Sets of *#define* directives that occur in more than one source-code file can be grouped into a single file. A file of this kind is called a *header file* and usually has a file type of *H*. Many compiler kits include header files; one such file commonly included with compiler kits is *STDIO.H*, which contains standard I/O definitions.

A header file can contain any valid C source-code statement or preprocessor directive. The *#include* directive causes header file records to be merged into a source-code file at compile time. As far as the compiler is concerned, the include file contents are part of the input source file. Moving common symbolic definitions to a header file reduces the need to modify source files when programs are ported to different environments. Any changes required can be made to the header files only; the changes will then be implemented whenever the source files are recompiled.

Math library routines generally return double-precision values. Since C's default function return type is *int*, any function that invokes such a math function must declare that math function to return type *double*. Declarations of this kind can be grouped into a math library header file called *math.h*, which might contain something like the following:

```
extern double sqrt(), sin(), cos(), tan(), atan(), asin()
extern double acos(), exp(), exp10(), log(), log10(), pow();
```

A program that uses a math function must reference this header file to ensure that the returned value is interpreted correctly.

```
#include "math.h"
   sub ()
{
        double d1,d2;
        d1 = sqrt (d2);
}
```

Ordinarily, the preprocessor searches the user's current default disk directory to find any include files. By specifying the include file as *#in-*

clude ⟨inc-file⟩, you may direct the preprocessor's search to a special library directory. Not all preprocessors allow you to do this. With DOS 2.0, this feature is a must if you want to compile C files in different subdirectories and don't want to put copies of your header files in each subdirectory.

#include files can be nested. That is, an included file may reference other *#include* files; the depth of nesting allowed is compiler-dependent. One awkward side effect of *#include* files is that even if a source file references only one of the math routines, all of them are declared. This might cause the compiler symbol table to overflow. When designing *#include* files, make sure that they contain logically related entries and that they are of manageable size.

Here are some useful header file examples for the PC keyboard:

```
/* FKEY.H - IBM-PC Function key scan code header file */

#define F1 59
#define F2 60
#define F39 112          /* ALT F9 */
#define F40 113          /* ALT F10 */

/* KEYPAD.H - IBM-PC keypad scan code header file */

#define HOME 71
#define CUR_UP 72
#define PG_UP 73
#define CUR_LEFT 75
#define CUR_RITE 77
#define END 79
#define CUR_DOWN 80
#define PG_DOWN 81
#define INS 82
#define DEL 83
```

It's easy to create many other useful header files. Here are some suggestions:

GRAPHICS.H — the 128 graphics chars (code 128–255)
SGR.H — definitions for DOS v2 ANSI.SYS SGR sequence
ASCII.H — names of commonly used characters, such as escape, space, and tab

Conditional Directives. There are certain preprocessor directives that allow source code to be compiled on a conditional basis—a capability normally found only in assemblers.

```
/* prepro1.c — demonstrates the use of conditional compilation
                    directives */
#define ON 1
#define OFF 0
#define TRACE ON
#define DEBUG ON
#define TRACEMSG(s) printf ("TRACE entered function %s.\n",s)
#define EOF -1

main ()
{
        int c;
#if TRACE
        TRACEMSG("main");
#else
        printf ("TRACE is off.\n");
#endif

while ((c = getchar ()) != EOF) {

#ifdef DEBUG
        #if DEBUG
                printf ("\tChar is %c ascii value %d.\n",c,c);
        #endif
#else
        printf ("Symbol DEBUG is undefined.\n");
#endif

        if (isdigit (c))
                printf ("Character is a decimal digit.\n\n");
        else
                printf ("Character is not a decimal digit.\n\n");
        }
}
```

This code produces the following output:

```
TRACE entered function main.
A        Char is A ascii value 65.
Character is not a decimal digit.
1        Char is 1 ascii value 49.
Character is a decimal digit.
```

The *#if* directive tests the value of an expression. The expression, when compiled, must result in an integer constant. In *prepro1.c*, the symbol *TRACE* has been assigned the value *ON* (which is 1).

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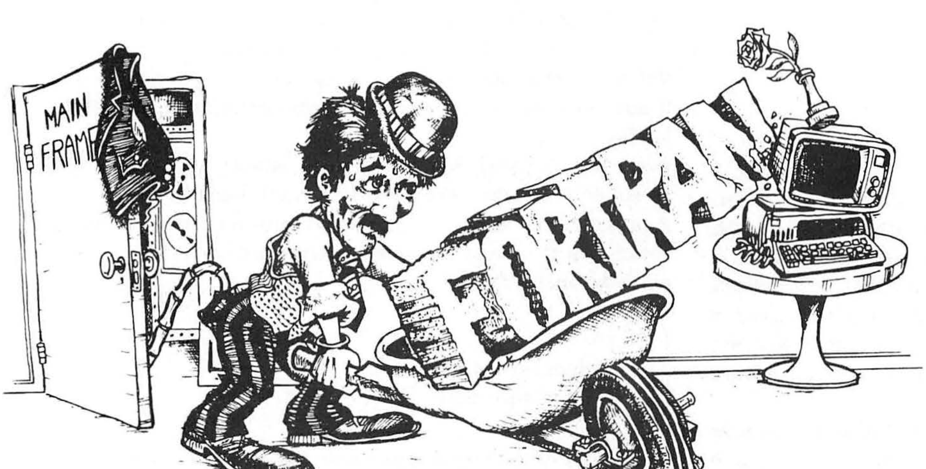

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Therefore, *TRACE* is true (nonzero) and the statement *TRACEMSG("main");* is compiled. If *TRACE* were false the statement *printf ("TRACE is off. \n");* would have been compiled instead. The *#else* directive separates the true and false conditional compilation paths. If only the true path is required, the *#else* can be omitted. *#endif* terminates the current *#if* directive's scope.

#ifdef checks the preprocessor's symbol table to see if the specified symbol has been defined. If it has, all statements up to the next *#else* (or *#endif*) are compiled. *#ifndef* results in the compilation of code only if the given symbol is *not* currently defined. Note that before testing the symbol *DEBUG* to see if it was true, we checked to see if it was defined. If we had omitted the *#ifdef* check and if that symbol had not been defined, we would have gotten a preprocessor error at compile time. It's a good practice to make sure a symbol exists before testing its value.

As the example above demonstrates, conditional constructs can be nested.

The example is intended to show the possible use of symbols such as *TRACE* and *DEBUG* as aids in program testing and debugging. Only when these symbols are defined are their respective statements compiled.

The following code

```
/* prepro2.c - more on conditional compilation */

#define COND1 1             /* mask for bit 0 */
#define COND2 8             /* mask for bit 3 */
#define COND3 16            /* mask for bit 4 */
#define COND4 64            /* mask for bit 6 */
#define FLAG COND1 | COND3 | COND4 /* set up flag word */

main ()
{
        printf ("FLAG value is %x (hex). \n",FLAG);

#if FLAG & COND1
        printf ("COND1 bit set in FLAG. \n");
#endif

#if ((FLAG & COND2) == COND2)
        printf ("COND2 bit set in FLAG. \n");
#else
        printf ("COND2 bit clear in FLAG. \n");
#endif
}
```

produces this output:

```
FLAG value is 51 (hex).
COND1 bit set in FLAG.
COND2 bit clear in FLAG.
```

Here we see two examples in which the *#if* expression involves the bitwise *AND* operator *&* (this operator will be discussed later); these examples demonstrate bit-masking with conditional compilation expressions. In fact, such expressions can involve any syntactically correct combination of integer and character constants and binary operators.

The *sizeof* Operator. Although this operator is not related to the C preprocessor, it is sometimes used in conjunction with the *#if* directive when code is intended to be portable between machines with differing word sizes. *sizeof* lets you test the size of a particular variable type at compile time.

```
sub ()
{
```


```
#if sizeof(long) > sizeof(int)
        long counter;
#else
        int counter;
#endif
#if sizeof(short) < sizeof(int)
        short tiny1,tiny2;
#else
        int tiny1,tiny2;
#endif
}
```

This compile-time operator returns an integer equal to the size of the object type given to it. The size is in bytes, where a byte is the amount of storage used to represent a char variable (on the PC, eight bits).

```
/* sizeof.c — demonstrate use of the sizeof operator */

main ()
{
        int i;
        float f[6];
        double d[5];

printf ("Size of type int          is %d bytes.\n",sizeof(int));
printf ("Size of type long         is %d bytes.\n",sizeof(long));
printf ("Size of element f[3]      is %d bytes.\n",sizeof(f[3]));
printf ("Size of array d           is %d bytes.\n",sizeof(d));

i = 4 * (sizeof(short) + 5);
printf ("i is %d\n",i);
}
```

produces the output

```
Size of type int     is 2 bytes.
Size of type long    is 4 bytes.
Size of element f[3] is 4 bytes.
Size of array d      is 40 bytes.
i is 28
```

Here we see that the *sizeof* operator works for variable names and arrays as well as for data types. The expression *i = 4 * (sizeof(short) + 5);* shows that the *sizeof* operator expression can be used anywhere in place of an integer.

```
/************************************/
/* isalnum.c — returns TRUE if input chr is alphabetic or numeric,
               else returns FALSE */

isalnum (chr)
char chr;
{
        return (isalpha (chr) || isdigit (chr));
}

/************************************/
/* isascii.c — returns TRUE if input chr is a 7-bit ascii code, else
               returns FALSE */

#define NULL 0
#define DEL 0x7f                /* ascii delete character */

isascii (chr)
char chr;
{
        return (chr >= NULL && chr <= DEL);
}
```

More Useful Functions. *#define DEL 0x7f* assigns the string 0x7f to *DEL*. Any string beginning with 0x (or 0X) is assumed to be a hexadecimal constant. Any string beginning with 0 without an x is assumed to be an octal constant. The ASCII delete character has an internal value of 127 decimal, 7f hex, or 177 octal. In other words, 127, 0x7f (and 0x7F), and 0177 are equivalent. A special form of character constant can be used to assign any desired bit pattern. *'\nnn'* is a character constant whose bit pattern corresponds to the octal number nnn. nnn may be from one to three octal digits. Thus the delete character could be represented by *'\177'*.

Note that the PC uses the backspace key (decimal 8) to rub out characters; there's no separate delete key on the PC. Many other ASCII keyboards have both keys.

You may wonder why *isascii ()* checks for *chr >= NULL*; after all, the ASCII character set doesn't include negative values. The PC uses a modified ASCII set that has 256 characters—128 ordinary characters between 0 and 127 and 128 graphics characters with values between 128 and 255. Any of these values can be stored in eight bits, the size of a char variable for PC implementations of C. C requires a char variable to be large enough to store any member of the implementation's character set and makes no judgment about whether or not chars can be signed. The problem arises when chars are treated by one compiler as signed and by another as unsigned; a char variable with the value 0x80 (high bit set) then could be interpreted as either −128 or 128, depending on the compiler used. Therefore, on some implementations, a char with such a value may test as < DEL and on others as > DEL. *Beware.*

One final word about *isascii ()*. It can be used to test if chr is one of the modified character codes in the range of 128 to 255. If it is, *isascii ()* returns a value of FALSE.

Next month we'll begin an exciting journey through the perilous pits of pointer land, where we'll wrestle with two-headed lists and look up the addresses of a few magical characters. ▲

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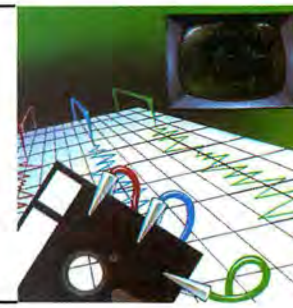

Unless otherwise indicated, software listed runs in DOS 1.1 or 2.0 with either display adapter and requires 64K and at least one disk drive.

Property Management

Property Management is a bookkeeping system that automates management of residential and commercial income properties. It records property-related expenses and income derived from tenant collections and prints detailed income/expense statements. Several reports are available on the current status of any property. The program can be used alone or it can be interfaced with accounting systems from Continental or Peachtree to provide extensive asset/liability accounting, vendor management, check writing, and other capabilities.

The financial part of *Property Management* allows either accrual or cash accounting. An easy-to-use set of menus leads the user through the system, allowing timely access to such information as overdue rents, expiring leases, and tenant biographical data. Assessments such as condominium fees can be divided among all or some of the tenants. These charges may be prorated by floor space, rent, or number of tenants.
balances for any particular tenant. A formula can be entered (and subsequently changed) to calculate lease rates for commercial properties. Automatic posting of late charges for rent delinquency can be selected. When rents are raised, the date and percentage of the increase are recorded. Reports can be printed with addresses suitable for window envelopes. Tenant address-label printing is also possible. Detailed information can be stored about properties; property units such as condominiums, apartments, town houses, and offices; or tenants. Report information can be selected by a wide range of criteria and can be printed in useful sorted orders. A complete set of all possible reports, with sample data, is included in the user manual.

Monthly rent charges can be posted automatically. Complete bookkeeping of individual transactions, such as tenant charges, deposits, rental payments, and refunds, is available. An audit trail is provided for all transactions each month. All property-related expenses, depreciation, and nonrental income can be recorded in an IRS-like format.

Each menu option typically has a three-character mnemonic and a description of that option. The menu system is hierarchical and orderly. The function keys are used extensively to change menus and data.

The programs are written in interpreted BASIC. The installation procedure is adequately documented and simple. Installation and runtime batch files use BASIC. Modifications must be made to these files if BASICA is to be used instead. Commas are not allowed within input character strings, presumably because of the restrictions of BASIC's input statements. Dates are entered as three separate digits, which seems unnatural and should be changed.

Rental units and tenants are identified by codes of ten and eight characters respectively. Provision is made for a nine-digit zip code on all addresses. Each unit has a four-character descriptive code to identify it as something like 1BR or 2BRD. It's difficult to create meaningful descriptions with such short, cryptic codes. Also, only five unique unit codes are possible. Many residential buildings have more than five types of units, such as 1BR-1B, 2BR-11/2B, 2BR-2B, . . . all the way up to penthouse.

When new properties or tenants are added, existing property and tenant information can be used as a template. The default values for many fields can save on typing if the new data is organized appropriately. Reports seem to have a page eject at the end of each page rather than at the beginning, which causes a report to start printing wherever the paper is on the printer, without going to the next page first. Control-break is disabled, which forces the user to exit the system in an orderly

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— Challenge Observers

KINGS PARK, NY – Jack2 was ranked as the best document preparation software by Challenge observers in New York, Philadelphia, and San Francisco. Competing with integrated software packages such as WordStar/Lotus 1-2-3, Lisa, VisiOn, Peachtext 5000, Context MBA, and MultiMate/SuperCalc 3, Jack2 was able to complete the three problems presented to contestants faster and with a more impressive printed output.

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and controlled fashion. This helps ensure that related files don't get out of synchronization.

The user manual has several hundred pages in a notebook-sized binder. The artwork is of good quality, well laid out, and easy to follow. A useful property management and computing glossary is provided, as is a comprehensive index. Another chapter covers the basics of property management. Many screen layouts are presented to assist the user with each menu.

The package includes the user manual, a warranty registration card, and two single-sided disks. Registration costs $20 and entitles the user to telephone support and program updates. The disks are not copy-protected, and extensive installation and backup instructions are provided, including the use of hard disks. One significant omission is a set of demonstration files to help the user learn the system. These would allow the user to follow the manual more closely and to better understand and modify the example reports.

The hardware required includes two disk drives, 128K, and a 132-column printer (or an eighty-character one that allows condensed printing). With a single-sided disk, twenty-five properties can be stored, each with 250 units. A double-sided disk holds twenty-five properties, each with five hundred units, while a hard disk permits twenty-five properties, each with one thousand units.

The *Property Management* system is well designed and packaged, and the documentation is well above average.

—*Rex Jaeschke*

Property Management, Continental Software Company (11223 South Hindry Street, Los Angeles, CA 90045; 213-417-8031). $495.

Knoware

If you know enough about computers to be reading this magazine, you might not be interested in introductory overviews. On the other hand, you probably have some friends you would want to introduce to *Knoware*. This package is the sort of thing you'd expect to see at a computer company's open house. It combines an overview of business applications with a game that is scored by how much the player learns along the way.

You the player start off as the mail clerk in a mailroom. Your goals are a promotion to chairman of the board and assets of one million dollars. Simple problems in using the computer are explained, and successful completion of each wins you a promotion to the next level and a cash bonus. You can either take the promotion, or defer it until you've solved a few more problems at the same level and racked up some more bonuses.

For example, the first problem is to stop a thief from stealing packages from the mailroom. A nicely done graphics display shows the thief trotting out with parcels under his arm, and a line of text explains that a vertical line across the door will stop him. The program then shows a sample BASIC *line* command and asks you to draw a line using the grid numbers along the top and left of the picture. If you do it right, the program congratulates you, adds money to your cash assets, and offers a promotion. If you decide not to take the promotion, you can try other graphics instructions and earn more money. Each time you *do* accept a promotion, a different graphics screen appears, with a big congratulation and a musical chorus.

Subsequent levels of play introduce you to word processing, spreadsheets, and simple editing of a BASIC program. Until you reach the level of president, you can get hints, which are free, or answers, which cost cash. After each promotion (once you've learned about the investment program), you can invest your money in stocks or bonds. All the problem steps are prompted, and all the programs can be run separately, outside of the game, so they can actually be used for some simple business tasks.

Your business career starts in August 1967, when you are twenty-five and have sixty years before retirement. The game clock runs continually, and the months and years tick off at the bottom of the screen between problems, along with your current financial position. If you make a bad investment, a message might appear telling you which of your stocks has gone bankrupt and how much money you're going to get as a return on investment.

Once you accept a promotion to president, the last game step before chairman, *Knoware* will run a "mouse race" for you—complete with the "William Tell Overture" in the background—or let you run a biorhythm chart. The game problems at this level let you enter some random data, but the program logic checks your answers and asks a pointed question at the end of each step to make sure you actually completed the problem. If you're eligible for promotion to chairman but haven't acquired a million dollars yet, the game reminds you gently that you can't win if you accept the promotion. You'll be given the chance to earn more money (through bonuses or investments) at your current level.

After you've earned your million and accepted the promotion, you get a rousing chorus of "The Star Spangled Banner," plus three airplanes towing congratulatory banners behind the Statue of Liberty (complete with flaming torch). You then can rerun *Knoware* from the beginning (or from any job title level) or run any of the application programs for practice.

Knoware is a good introduction to computer use for people who are completely blank on the subject. Although some of the game problems could use more initial explanation, none of them is particularly hard, and the program objective is to teach users rather than frustrate them. It succeeds in this reasonably well.

Unfortunately, two annoying little problems mar the package. First, the initial program display, which just shows the copyright information, is dull, drab, and stays on the screen for an interminable thirty seconds while the first program loads. The second display also contains

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copyright information as well as a really attractive graphics image of the company logo and a Greek temple. It's a shame that the first screen is there at all, since it presents a bad face to the world.

The other annoyance is the way most of the messages are displayed. Each one is laboriously typed out, character by character, with a tone-generated click to make it sound like Teletype output. This is slow and gets old in a hurry. Although it's a cute touch for the opening instruction display, its elimination would in no way harm the program.

Knoware will not run on a monochrome display, because of its graphics, and it requires a minimum of 128K. It will run on the Model 67 PC*jr* (with disk drive), but it's agonizingly slow. Those key-click characters take seconds to run, and even the music goes at half speed. If you're desperate, you can run it on your Junior, but it may sour your noncomputing friends.

Knoware is a pretty good idea, and it's well implemented. If you're in business and you'd like to introduce your clerical staff to basic business programs, this is a good way to start. Besides, you'll enjoy the mouse races.

—Dian Crayne

Knoware, Knoware (301 Vassar Street, Cambridge, MA 02139; 617-576-3821). Requires color/graphics adapter. $95.

Forbidden Quest

Text-adventure enthusiasts will have a great time with *Forbidden Quest* by Pryority Software. This is one of those games where puzzle solutions are maddeningly obvious—once you've figured them out.

Play starts in the control room of a small spaceship, with the warning bell ringing. You must repair your craft, land it safely, and get off the crippled ship and onto the surface of the first planet. Yes, that's right, the *first* planet. There are three planets to visit, and an alien spaceship to take you there, plus the usual lovely princess and unfriendly alien monsters.

If you're a video-game enthusiast and have never played a text adventure before, you might want to give your reflexes a rest and look at this one. As the player, you see written descriptions of places, things, and people. You give instructions about where you want to go and what you want to pick up and put down. You earn points by solving puzzles—such as how to get past a slobbering, meat-eating monster and into some other section of the game.

The game's parser (the section of the program that interprets your instructions) is above average. It recognizes six-character words and accepts complete sentences. Although it knows what adjectives are, it can be a little erratic in its response to them. For example, it correctly demands to know which button on the control panel you want to push, the red or the black, but it also insists that you refer to another object as the "notched rod," even though you're carrying only the single rod. Room descriptions are well written, and the game as a whole is logical and well thought out.

Forbidden Quest uses only cardinal directions (*N S E W*) plus *up* and *down*, but it also has a good grasp of containment and lets you put some objects inside others. One amusing bug in the containment logic surfaced in connection with the locker in the spaceship. The locker was locked, but sundry objects such as the space suit could be put "in" the locker and would obediently vanish from view. Fortunately, they could be retrieved from the closed locker the same way. Neither of the objects that were legitimately inside the closed locker, however, could be removed until the door was unlocked with the key. (The programmers at Pryority are fixing this problem.) Early versions of the game also had some problems booting on the PC*jr* because of a change in the protection code, but this has been corrected.

A set of five drawings, one in full color, comes with the game and provides clues that aren't in the game itself. For example, the first print shows an alien monster called the Wobyte standing menacingly in front of a ruined staircase. The staircase is not mentioned in the game and provides an essential clue for solving one puzzle. Another useful feature is the use of function keys for such common actions as saving and restoring games, taking inventory, and issuing commands to wait. Function 10, the panic button, flips a spreadsheet onto the screen in case you're playing *Forbidden Quest* on someone else's time. An overlay card (which has to be cut out of the instruction sheet) comes with the game.

One bit of whimsy comes up every hundred moves or so. A message appears informing you of a certain "localized discomfort." If you ignore the warning, another message appears some half-dozen moves later saying, "The discomfort is becoming intolerable!" If you continue to ignore the warning, you die. The game announces that "You double up in agony as your bladder bursts; even heroes go to the bathroom."

As in most other adventure games, death is not permanent. In addition, you can save up to ten games so that you can tackle fresh problems without completely ruining your score. No hints or help messages are available, and the game has a high-score range—3,500 points for a perfect run. Standard adventure treasures—gold rings, silver bracelets, boxes of precious jewels, and so on—are absent, but the utility of some more ordinary objects will surprise you.

Whether you are a seasoned adventurer or a novice, you'll find *Forbidden Quest* an excellent escape from reality, with enough puzzles and action to occupy a week's worth of evenings. Although not as fiendishly difficult as Infocom's games, *Forbidden Quest* is fun to play and gives you a sense of accomplishment when you've avoided death for the final time.

—Dian Crayne

Forbidden Quest, Pryority Software (Box 221959, Carmel, CA 93922; 408-625-0125). Requires 128K. $39.

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Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ Access to more than two hundred on-line databases offered by Dialog Information Services is provided by *In-Search*, available from **Menlo Corporation** (4633 Old Ironsides Drive, Santa Clara, CA 95050; 408-986-0200). The databases contain more than eighty million articles and references from thousands of sources, including newspapers, magazines, journals, directories, and news services. Requires 192K, two double-sided floppy drives or one floppy and one fixed drive, and a Hayes or Novation modem. $399.

Δ The *PCI Cross Assembler* for the NS16000, from **Program Concepts** (Box 8164, Charlottesville, VA 22901; 804-978-1850), turns the PC into a development system capable of making programs for thirty-two bit computers. Written in C, the program consists of four utility packages: Cross Assembler, Cross Link, Debugger, and Librarian. The program features full macro capabilities, floating point, and memory-management unit. Requires two 360K drives, 192K, and DOS 2.0. $595.

Δ *Opt-Tech Sort 2.0* is an easy-to-use assembly language sort/merge program from **Opt-Tech Data Processing** (Box 2167, Humble, TX 77347; 713-454-7428). Features include sorting *dBase II* files and the ability to be linked as a subroutine. The program can simultaneously sort up to ten input files of any record length or file size. $99.

Δ **Systems Plus** (1120 San Antonio Road, Palo Alto, CA 94303; 415-969-7047) has introduced *Lead Manager*, which is designed to put salespeople in control of their productivity. The program allows for the creation of an unlimited number of individual, mergeable contact lists. $350.

Δ A standalone computer that plugs into a PC, *The Intelligent Data Collector*, from **Tech-S** (12997 Merriman Road, Livonia, MI 48150; 313-425-9800), collects, stores, and then transmits on request such data as time, attendance, and other management information. It is designed to help eliminate errors caused by the handling of time-card data and reduce the time consumed in calculation and preparation of employee payrolls. $2,995.

Δ **CMA Micro Computer** (55722 Santa Fe Trail, Yucca Valley, CA 92284; 619-365-9718) announces several programs for the PC*jr*. *Docuwriter jr* is a word processor similar in design to those that the firm markets for use in the medical, dental, and legal professions. The disk file outputs of the system are fully compatible with most popular PC word processors such as *WordStar*. $79.95. Δ *Dental Transcriptionist* allows users of the firm's PC dental billing packages to operate the diagnostic elements on Junior. The program is designed for dentists having multiple office locations or wishing to view diagnostic treatment plans in their treatment rooms. $249.95. Δ *Medical Remote Entry* allows users of CMA's other IBM medical billing applications to enter patient billing transactions from their homes, the hospital, or a second medical office. $249.95.

Δ *WordPerfect jr* has been introduced by **Satellite Software International** (288 West Center, Orem, UT 84057; 801-224-8554). The program shows boldface, centering, underlining, margins, and spacing on the screen as text is typed. Documents created with it are compatible with the firm's other word processors, *Word Perfect* and *Personal WordPerfect*. $69.

Δ **Micro Logic Corp.** (Box 174, 100 Second Street, Hackensack, NJ 07602; 201-342-6518) offers *Micro Chart #7*, a plastic reference card for programmers of the 8088 and 8086. It covers conversion of instructions to and from hex, instruction descriptions, cycle time, addressing modes, flag codes, register map, memory map, pinouts, ASCII, diagrams, cautionary notes, and other topics. $5.95.

Δ The *I^2 DiskSystem* from **Interface Inc.** (7630 Alabama Avenue, Canoga Park, CA 91304; 818-341-7914) provides 33.3 megabytes of formatted storage under DOS 2.0. $2,795.

Δ **Smith Micro Software** (Box 604, Sunset Beach, CA 90742; 213-592-1032) announces *Market Link*, a product that provides the user with one-key access to the Dow Jones News/Retrieval Service and The Source. Additionally, the user can define up to twenty-seven security symbols for automatic quote fetching from the Dow Jones service. $59.95.

Δ **The Answer in Computers** (6035 University Avenue, San Diego, CA 92115; 619-287-0795) announces *Security*, a protection package that provides password and user code protection for all programs without affecting normal processing or modifying the operating system. $50.

Δ **MicroPhonics Technology Corporation** (Box 7411, Federal Way, WA 98003) offers *Oto-I*, a speech recognition system that consists of a single circuit board that plugs into any expansion slot on a PC or XT. The system features better than 98 percent word-recognition accuracy and a 128-word vocabulary on-board, expandable to 512 words or short phrases. $795.

Δ **Northwest Computerworks** (9725 S.E. Thirty-Sixth Street, Mercer Island, WA 98040; 206-232-6343) has released *Moneyworks Property Management System*. The program automates the critical functions of real estate management. Reports include vacancies, lease expiration dates, summaries, tenant statements, and cash balance. The system also prints checks. $795.

Δ **Whelan Associates** (723 Skippack Pike, Blue Bell, PA 19422; 215-643-7470) has created *Corporate Profiles* to assist personnel managers with their corporate recruiting efforts. The program maintains candidates' names, addresses, phone numbers, current and desired income, current employer, and current position. Through the use of user-defined qualifying codes and weighting factors, the recruiter is able to define the qualifications. $1,000.

Δ An integrated business software package has been announced by **Softrend** (2 Manor Parkway, Salem, NH 03079; 603-898-1777). *Aura* employs four modules to offer database management, spreadsheets, word processing, and graphics functions. A built-in applications generator allows users to tailor and update program menus or user-specific sequences of operations. $495.

Δ **Gryphon Microproducts** (Box 6543, Silver Spring, MD 20908; 301-946-2585) has introduced *dHelper Part 1*, a utility program for *dBase II* that gives a formatted output listing of a system of *dBase II* program and data files. $150.

Δ **Mosaic Software** (1972 Massachusetts Avenue, Cambridge, MA 02140; 617-491-2434) has released *Softplot/BGL*, a device-independent graphics extension system allowing users to create custom graphics applications in BASIC. The program features two-dimensional viewing with windows, three-dimensional plotting, dashed and colored lines, image rotation, and automatic text justification. $99.

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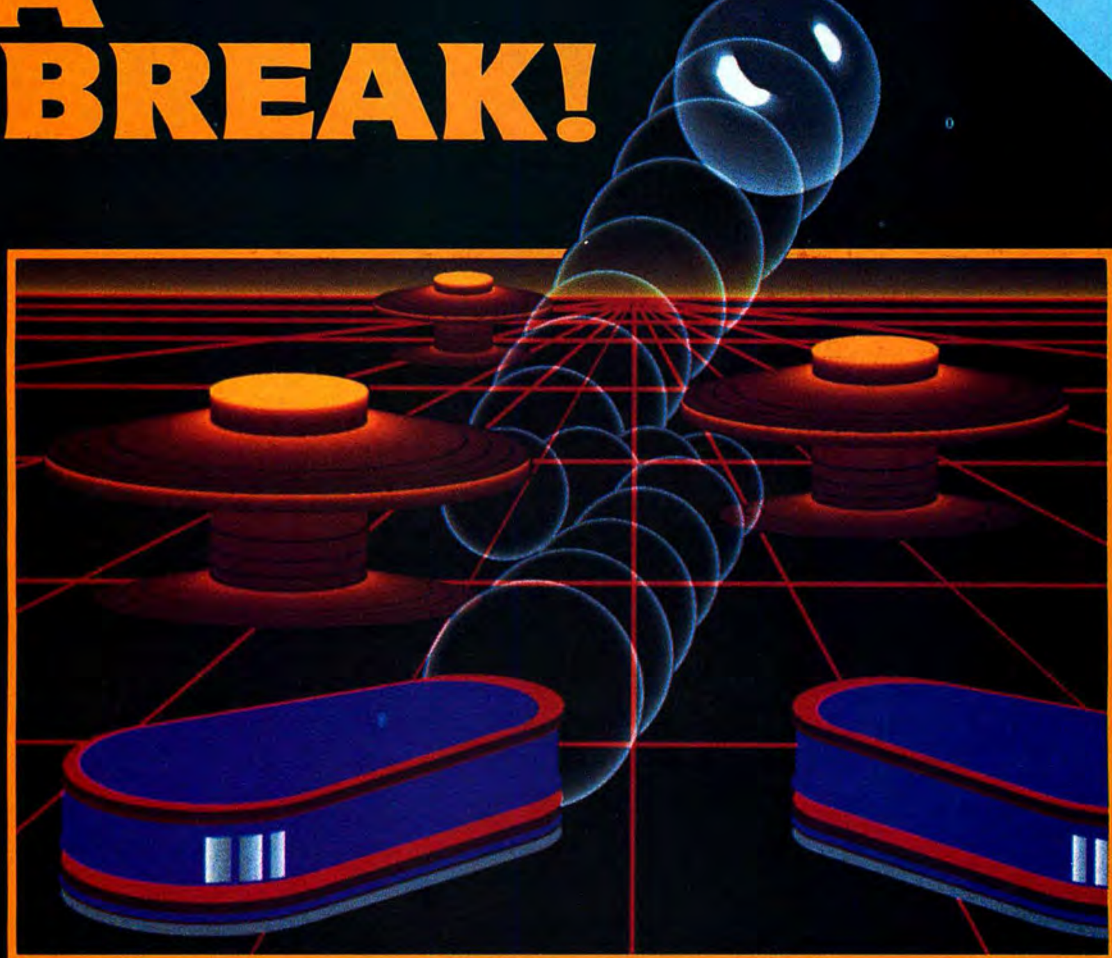

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Δ **Blaise Computing** (2034 Blake Street, Berkeley, CA 94704; 415-540-5441) has introduced *Exec—The Program Chaining Executive*, a general-purpose chaining program for all DOS languages. It features a common data area for passing information between programs. $95.

Δ *Professional Basic*, a sixteen-bit language that can access the 8087 coprocessor, is available from **Morgan Computing Company** (10400 North Central Expressway, Dallas, TX 75231; 214-739-5895). It contains a window-oriented system of more than a dozen tracing and debugging screens. The user is able to view changes in variables or array elements, progress of *for-next* loops or subroutines, and more. Values of each variable are displayed at every point during execution of the program. Requires 256K. $345.

Δ A software module permitting users to access databases from Business Library business software files and use them to form new sequential ASCII files and reports has been released by **The Business Software Library Corporation** (994 South Fair Oaks Avenue, Pasadena, CA 91102; 818-793-1700). *The Business Library Information Retrieval Service* permits data recovered from password-protected files to be used as generated or to be merged into other data files. $395.

Δ The *Passport* printer emulator, from **Micro Computer Components** (8660-D Miramar Road, San Diego, CA 92126; 619-453-3367), is a dual-purpose device designed to prevent potential time and data loss. When selected for print by-pass operation, it appears as a standard printer device, preventing lockup of the keyboard if a printing function is inadvertently invoked. In print pass-through operation, the device permits normal printing operations. Users can quickly abort an ongoing printing operation by switching back to the print by-pass mode. $29.95.

Δ *The State of the Art Bookkeeping System*, an all-in-one system for accounting and reporting programs for small retail and service businesses, is available from **State of the Art** (3183-A Airway Avenue, Costa Mesa, CA 92626; 714-850-0111). Optionally, the system can be integrated into the *State of the Art Budget & Financial Reporting System* for more complex, customized financial reporting. $495. Optional hard-disk installation kit, $95.

Δ *CouponOmizer*, from **Natural Software** (7 Lake Street, White Plains, NY 10603; 914-761-9329) is a home-management system that organizes discount coupons and rebates. The program provides fast entry and display of all types of discounts, prepares shopping lists, tracks rebate requirements, permits user definition of displays, purges expired offers, verifies computer records against paper records, and maintains product classification categories. Runs on PC*jr*. $49.95.

Δ **Mindset Corporation** (617 North Mary, Sunnyvale, CA 94086; 408-737-8555) has announced the *Mindset Personal Computer*, an IBM compatible with powerful color graphics. The computer combines the Intel 80186 processor with two Mindset-designed graphics coprocessors. It can be configured to support two 360K disk drives and up to 256K of RAM. $1,099 to $2,398.

Δ The *Microsoft Mouse Menu*, a utility program that permits use of the Microsoft Mouse with PC application programs, has been announced by **Microsoft Corporation** (10700 Northup Way, Bellevue, WA 98004; 206-828-8080). Microsoft has provided prewritten mouse menus for *Multiplan*, *1-2-3*, *WordStar*, and *VisiCalc*. Once the software is installed, the mouse can be used to initiate commands that formerly were entered via the keyboard. $195. Δ *Microsoft Chart* is a business software graphics program that allows users to prepare presentation-quality charts from data generated by programs such as *Multiplan*, *1-2-3*, and *dBase II*. Users choose from various sample chart formats. Variations on eight basic chart types provide a choice of forty-five different chart forms. $250.

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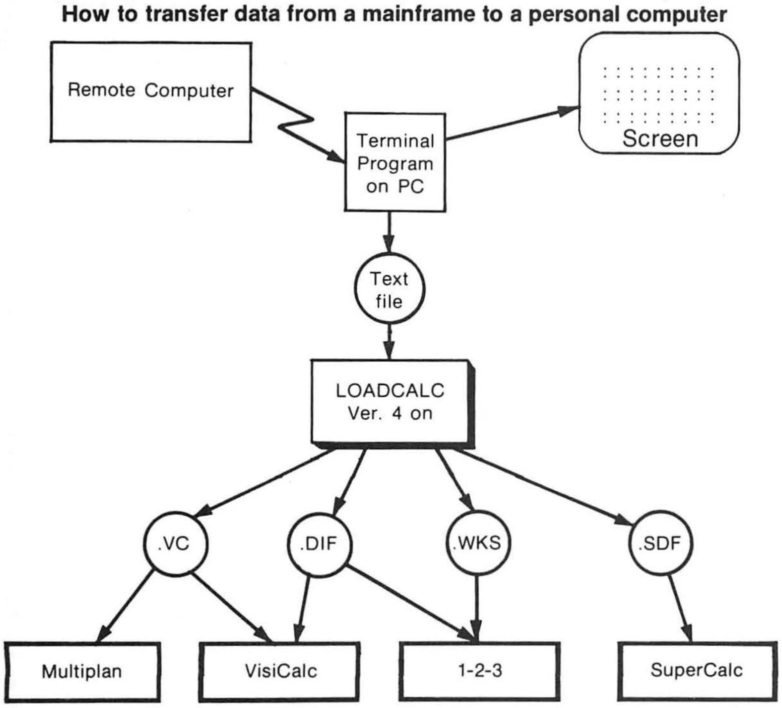

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Δ **Sapana Micro Software** (1305 South Rouse, Pittsburg, KS 66762; 316-231-5023) has released PCjr versions of its *Mail-Track-I, Expense-Track-I,* and *Household-Inventory-Track-I* programs. Each program is in compiled form, and once a program is loaded, the program disk can be removed, thus freeing the drive for a data disk. Requires 128K. $49.95 each.

Δ **Aardvark/McGraw-Hill** (1020 North Broadway, Milwaukee, WI 53202; 414-225-7500) has announced *Fixed Asset Accounting,* a program developed for controllers, CPAs, attorneys, and financial planners. The program generates thirty reports and listings for tax preparation, forecasting, asset record-keeping, and general financial planning. Requires 128K, two 360K drives, and a printer. $800.

Δ A program that performs several commonly used financial calculations has been released by **Syntax Systems** (6642 South 193rd Place, Kent, WA 98032; 206-251-8438). *The Financial Analyst* features three options: investment analysis, depreciation analysis, and loan analysis. $50.

Δ *Logoville,* from **Tuttle Products** (Box 26981, Tamarac, FL 33320), is a board game designed to help children aged five to twelve learn the most commonly used graphics commands in Logo. No computer is required to play the game, and no prior computer experience is needed. The game is compatible with all currently available versions of Logo. $14.95.

Δ *MediWORD,* a medical dictionary for use with *SpellStar,* has been announced by **Professional Network Services** (315-A Chestnut Street, Needham, MA 02192; 617-449-6460). The dictionary provides more than eleven thousand words commonly used by the health professions, including generic and proprietary drug names, medical procedures, diseases, signs, symptoms, and human anatomy. It has been designed to minimize duplication of words in *SpellStar's* dictionary. $95.

Δ **Hahn Computers** (2190-G Pimmit Drive, Falls Church, VA 22043; 703-790-8030) has developed *Propman,* a real estate program designed to provide record-keeping and reporting for residential property managers. The package provides automatic check writing along with reports on vacancy, lease termination, security deposit, current account balance, management fee, delinquent rent, owner/tenant listing, ledger, and checkbook reconciliation. $2,285.

Δ A package that creates a master index, labels, and descriptions of all office files has been announced by **Colorado Computer Classics** (800 Hayden, Longmont, CO 80501; 800-835-2446). *Sofdex* includes a set of ring-bound plastic sleeves, tailored to the PC keyboard, in which users can insert personal reference notes for operating the system. $94.75.

Δ **Software Solutions** (305 Bic Drive, Milford, CT 06460; 203-877-9268) has introduced version 2 of *DOSease,* a program that reduces the number of keystrokes needed to accomplish DOS procedures. A menu of more than thirty system functions is grouped into six categories: file, disk, directory, system, fixed disk, and other. $60.

Δ **Norfork Systems** (8 North Fork Road, Laurel Springs, NJ 08201; 609-783-4483) has announced *PC-Orgchart,* a menu-driven system for producing organizational charts. Requires 128K, Epson printer with Graftrax. $95.

Δ *Word Processing with Integrated Mail List Manager* has been introduced by **Leading Edge Products** (55 Providence Highway, Norwood, MA 02062; 617-769-8770). The word processing and mailing list functions are integrated so that users can open a folder of mail lists within the word processing environment. $495.

Δ **Alpha Software** (30 B Street, Burlington, MA 01803; 617-229-2924) has introduced *The Econometric Software Package,* a forecasting and planning tool. The program integrates full-functioned econometric and statistical analysis with graphics and data management. $795. ▲

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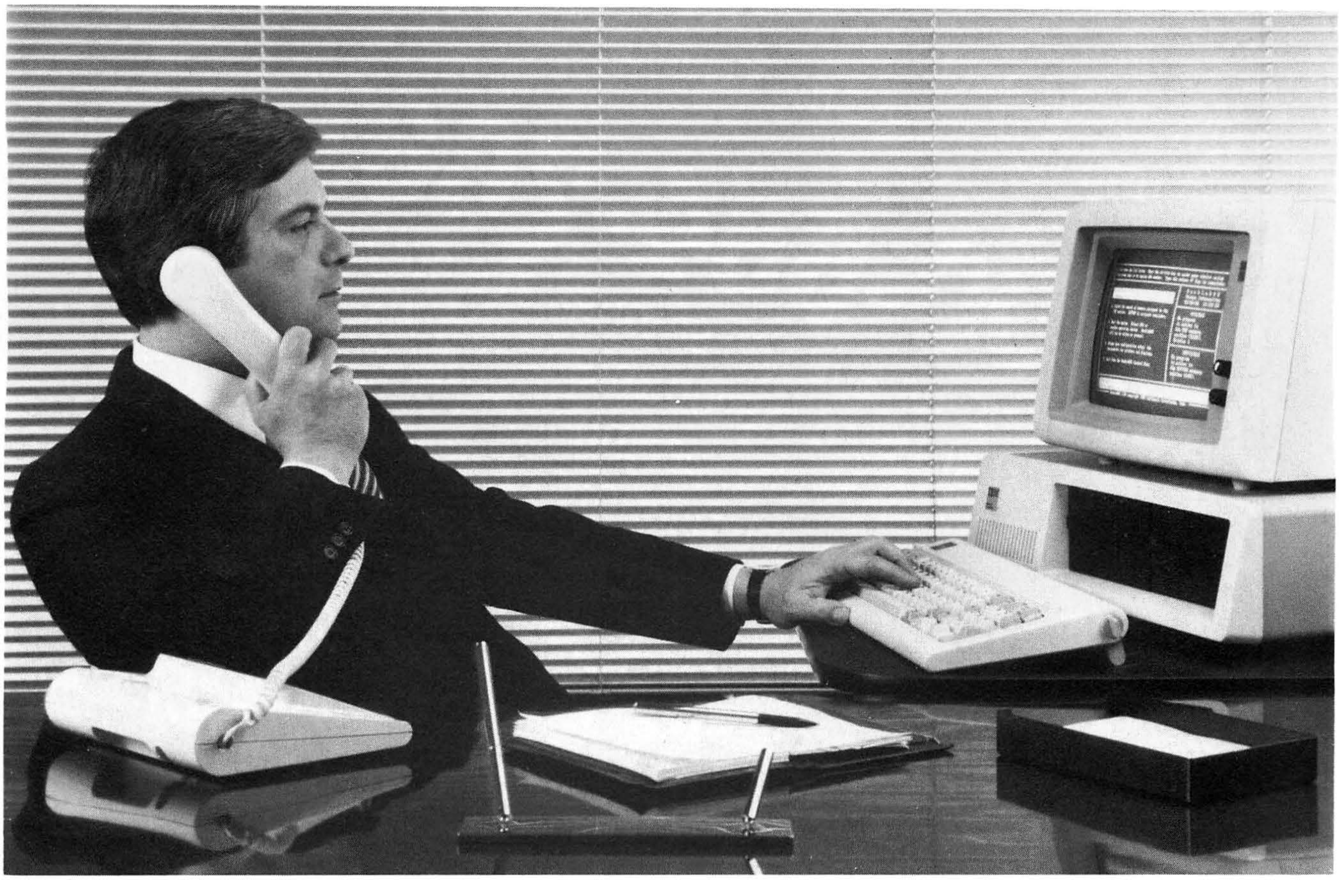

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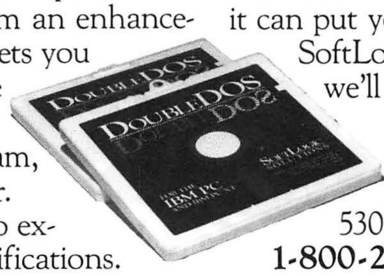

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WORLD CENTER FOR COMPUTERS FOCUSES ON POORER NATIONS

Paris is a long way from the Third World—the countless small farming villages of India, the rugged mountains of Chad, the tropical rain forests of Africa. Likewise, computers seem far removed from the parts of the world where food, electricity, and roads are scarce, and where most people are illiterate, never drink pure water, and never see a physician.

So how is it that a group who expressly means to find and nurture the Bill Budges and Mitch Kapors of the Third World comes to hail from the City of Lights?

Paris is a hub of modern civilization, a living record of the forward march of culture, society, and technology. And Paris is fast becoming a major center for advancement of the computer arts and sciences. When these things are taken into account, the fact that an organization dedicated to sharing computer technology with poorer, less-developed nations has its headquarters in the land of Balzac, Berlioz, de Gaulle, Napoleon, and Renoir makes a bit more sense.

The Centre Mondial Informatique et Ressource Humaine (World Center for Computers and Human Resources) opened early in 1982. Surrounded by expensive art galleries on avenue Matignon near the Champs-Elysées, the Centre Mondial is as global in its attitude toward computing as its name would suggest.

The center was inspired by *The World*

GOTO page 170, column 2

COSPAS-SARSAT RESCUE SYSTEM FLYING HIGH

Should you ever be in an airplane that's about to crash in a remote area, or on a ship that's rapidly sinking, the most vital piece of equipment you can possibly have—after a parachute or a life preserver—is a little metal box about the size and shape of a PC power supply.

The boxlike item is an emergency locator transmitter (ELT), which, upon impact or submersion in water, sends out a whoop over the aviation and maritime distress frequencies. An act of Congress in 1970 made it required equipment in general aviation aircraft. In 1972, the U.S. National Transportation Safety Board recommended that the Coast Guard and the FCC require the same of ocean-going vessels (in their case, the unit is known as an Emergency Position-Indicating Radio Beacon, or EPIRB).

The use of ELTs and EPIRBs was a good idea, with two rather large flaws: signal visibility and false alarms.

Lieutenant Colonel William Clark, director of the Air Force's inland search-and-rescue efforts, outlines the first problem: "The only way an ELT signal could be detected was if another airplane happened to be flying within radio range, happened to have the radio tuned to one of those frequencies, and heard the distress signal. The plane's pilot would then pass along his location to the FAA, and the FAA would pass it to us. We'd draw ever-decreasing circles until we could identify the search area and then launch our forces to go out and investigate.

"In the middle of the night in Kansas there's not a lot of air traffic; if you crashed you'd have to wait awhile."

In these early ELT days, both the National Aeronautics and Space Administration and the U.S. Coast Guard perceived that search-and-rescue operations

GOTO page 169, column 1

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What are the adverse effects of this compound?

Gary: The pedigrees for next week's auction are as follows...

Sold 1000 shares at 33 for net profit of 6000. Richard.

Wouldn't it be great if you could use your IBM* PC to tap into vast resource libraries across the country? To transfer files to your partner, upstate? Or from your broker, down the street?

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Hayes Smartmodem. Think of it as your computer's telephone. Hayes Smartmodem 300,™ and the faster Smartmodem 1200,™ allow you to communicate over ordinary phone lines.

But any modem will send and receive data. Hayes Smartmodems also dial, answer and disconnect calls. Automatically. And without going through the telephone receiver, making them far superior to acoustic coupler modems.

Choose your speed; choose your price. The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. For longer distance and larger volumes, Smartmodem 1200 operates at baud rates of 300 or 1200, with a built-in selector that automatically detects transmission speeds.

Both work with rotary dials, Touch-Tone® and key-set systems; connect to most time-sharing systems; and feature an audio speaker.

Smartmodem 1200B™ is also available as a plug-in board. Developed specifically for the PC, it comes packaged with Hayes' own communications software, Smartcom II.™

Smartcom II. We spent a lot of time developing it, so you can spend less time using it. Smartcom II prompts you in the simple steps required to create, send, receive, display, list, name and rename files. It even receives data completely unattended—especially helpful when you're sending work from home to the office, or vice versa.

If you need it, there's always "help." This feature explains prompts, messages, etc. to make communicating extra easy.

With Smartcom II, it is. Case in point. Before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters for 25 different remote systems are stored in a directory on Smartcom II.

Calling or answering a system listed in the directory requires just a few quick keystrokes.

You can store lengthy log-on sequences the same way. Press one key, and Smartcom II automatically connects you to a utility or information service.

Hayes®

Smartmodem 300, 1200, and 1200B are FCC approved in the U.S. and DOC approved in Canada.

Smartmodem 1200B. (Includes telephone cable. No serial card or separate power source is needed.)

Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit. In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

And, in addition to the IBM PC, Smartcom II is also available for the IBM Personal Computer XT, COMPAQ Portable, Corona Portable PC, Columbia MPC, DEC Rainbow 100, Xerox 820-II, and Kaypro II personal computers.*

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Computerized Sushi Bars to Appear in U.S. This Fall

Thanks to Japanese innovation, some sushi bars in Japan and others scheduled to open soon in the United States are computerized. The Sun Atom Company, under the direction of computer specialist and sushi fan Tsutomu Takeuchi, is marketing the Mi-Com system—a micro-based system that uncomplicates the ordering of sushi and takes the guesswork out of determining the bill. The first sushi bar with a Mi-Com system opened in Matsudo City near Tokyo last summer.

At traditional sushi operations, diners give their orders verbally to the *itamae*, the sushi chef, who then prepares the raw fish and steamed rice combinations as the customers watch. The chef presents the diners with a few pieces of the Japanese delicacy at a time, all the while keeping up a lively conversation. The *itamae* then gives the sushi eaters the bill, which customers sometimes find confusing, since the menu is written on the wall sans prices.

The Mi-Com system eliminates much of the potential for frustration. Customers make their choices by touching a light pen to special displays built into the countertop. The displays show the kinds and prices of sushi available. Customers can also use Mi-Com to cancel their orders before they are filled by the *itamae*.

Orders are electronically relayed to the *itamae*'s command panel in succession, enabling him or her to make the sushi promptly. The computer eliminates the chance of the chef's forgetting an order. The *itamae* is now able to take care of as many as ten customers at once, rather than three or four, the previous average.

The subtotal for the meal is flashed on the sushi eater's tabletop when the light pen is touched to the proper square. When the diners are ready to leave, they receive a combined or individualized computer printout, listing items, unit prices, and the total bill.

The Sun Atom Company is setting up franchise sushi shops and hopes to have forty in Japan by next year. Three shops are currently in operation in and around Tokyo. New Meiji Franchise Corporation in the United States is remodeling some of its sushi takeout shops and constructing new ones to accommodate the computer system. Takeuchi, through New Meiji, hopes to have twenty shops in the U.S. equipped with the Mi-Com system by early next year, starting first with the West Coast and Hawaii, then moving on to New York, Chicago, and eventually to the rest of the United States and Canada.

Computerized sushi shops were originally scheduled to open on the West Coast in time for the Summer Olympics, but now their projected opening is in September or October, according to New Meiji.

The computer hardware, each unit costing the equivalent of $1,070 in Japan, enables the shop to serve three times as many diners as in a traditional sushi parlor. It is already evident in the sushi shops using the Mi-Com that the average sushi eater is ordering more food than before and that more customers are being drawn to the shops.

The Mi-Com system is not the first attempt to incorporate high technology in sushi shops, according to Sun Atom. Recently, other companies have introduced sushi-making robots and conveyor-belt sushi delivery systems. But Sun Atom believes that the Mi-Com system is the most efficient method because it preserves the personal touch in sushi making, allowing the chef more time to converse with his or her customers. JG

The EEC Approves ESPRIT Computer Research Program

In an effort to keep Europe competitive with Japan and the United States in the high-tech arena of information technologies, the ten member countries of the European Economic Community (EEC) have given the go-ahead to an ambitious five-year, $1.25-billion research program dubbed ESPRIT.

The so-called European Strategic Program for Research and Development in Information Technology will be funded partly by the EEC Commission in Brussels and partly by twelve private computer and electronics companies.

The ESPRIT project will address five principal areas of research: advanced microelectronics, aimed at designing, manufacturing, and testing very high-speed large-scale integrated circuits; software technology, including what is described as "the management practices for information technology as well as the scientific knowledge underlying them"; advanced information processing, including the exploitation of VLSI; office automation and systems; and computer-integrated manufacturing.

Teams of university, government, and industry scientists will carry out the research, with the requirement that each project involve researchers from at least two EEC countries. In most cases, at least half of the funding for a project must come from non-commission sources.

As recently as last December in Athens, the EEC members were still delaying approval of the ESPRIT program—the technical details of which had been decided upon in the middle of last year—because of the members' failure to reach agreement on various broader aspects of the EEC's finances. However, in early March, Etienne Davignon, head of both the energy and industry directorates at the commission, was able to persuade both the West German government and British Prime Minister Margaret Thatcher to agree upon the project before further delay could undermine Europe's chances of remaining competitive in advanced information technology.

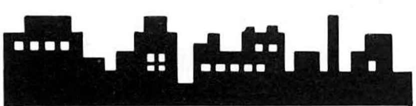
ESPRIT has been formed to address three major difficulties facing Europe's electronics industry as it tries to develop new technologies and remain competitive in international markets. The three difficulties center on the problem of raising long-term research and development funds during a period of economic recession and falling sales, a fragmented home market that is broken down into relatively small national units, and the reluctance of some within individual companies to subsidize those who have historically been economic and political rivals.

After the March meeting in Paris, where the project got its positive endorsement, Davignon called ESPRIT "the first optimistic decision of the years 1983 and 1984, which is going to impress both our American and Japanese partners." Laurent Fabius, French Minister of Industry and Research, also praised the project, claiming that the go-ahead decision also endorsed the broader strategy being promoted by France for increased cooperation between European countries in all fields of research.

A highly successful one-year pilot phase for ESPRIT, launched in the middle of last year with a budget of $20 million, attracted over two hundred research proposals, from which thirty-six were selected. EEC officials were impressed, not only with the number of proposals, but also with the apparent willingness of companies to let their scientists work together with few restrictions.

The twelve companies represented in the ESPRIT steering committee are Great Britain's GEC, ICL, and Piessey; West Germany's Nixdorf, Siemens, and AEG; France's CII-Honeywell Bull, Thomson-CSF, and CIT-Alcatel; Italy's Olivetti and SET; and Holland's Phillips.

Davignon has promised, in return for support from Great Britain and West Germany, that EEC resources for ESPRIT will be found by cutting back elsewhere in the EEC's planned research budget. These cuts could amount to $100 million out of a total of about $600 million next year, and even more in 1986. The single largest component in the commission budget is funding for research into fusion energy, and no significant reduction in this area is expected. The most likely target is the program of the EEC's joint research center at Ispra in northern Italy, though the Italian government may strongly resist such a move. DH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AP Testing for Computer Science Begins This Month

High school Pascal programmers across the country will be able to strut their stuff the tenth of this month when the Princeton, New Jersey-based Educational Testing Service (maker of the Scholastic Aptitude Test and most college entry exams) administers its first Advanced Placement examination in computer science.

Nationwide, some five thousand candidacies are expected on the Pascal test, said Harlan Hanson of New York City's College Board. The board decides what sorts of tests are needed and commissions ETS to design them. Pascal was selected because it has become the language of choice in higher education.

"Pascal gives students good programming practices—teaches them data structures—which BASIC really can't," says computer teacher Pat Flenner of El Camino Real High School in Woodland Hills, California, a Los Angeles suburb.

Knowledge of structured languages is also desirable in the job market, she says. Perhaps ten of her more advanced Pascal students will take the exam. Students at El Camino also study BASIC and have use of seventeen TRS-80 computers and fifteen IBM PCs. Like the students at Ulysses S. Grant High School in nearby Van

Nuys, all take high-level math before or while learning programming.

The three-hour test consists of two equally weighted parts, one containing fifty multiple-choice questions and the other presenting some five to ten problems that require programs to be written to solve them. The tasks may be as relatively easy as the finding of the average of ten numbers or as complex as the designing of an electronic bulletin board. Areas to be covered will include arrays, strings, files, algorithms, linked lists, stacks, and queues.

"Students haven't been fazed by the practice tests we've given them," said Dennis Anderson, programming instructor at Grant. About fifteen of his students have signed up to take the test. The school has one Apple computer for every ten of the one hundred eighty computer science students; the lab, and the Pascal course, were both instituted last September. Though many in Anderson's preparatory course (people taking the class don't have to take the exam, and vice versa) have studied BASIC and other computer topics, some have not. All have taken second-year algebra, and most have taken calculus; many own home computers.

If you score sufficiently high on an AP test, most colleges and universities will waive an entry-level course, award class credit, or both. Though it appears that most schools will grant unit credit for the Pascal test (general credit toward the total number of units needed for graduation), it remains to be seen whether they will award subject credit (accepting the test score in lieu of successful completion of an equivalent course at the school) in computer science, mathematics, or engineering. JP

Rescue System

continued from page 165

could be enhanced by improved position location and expanded monitoring—that is, by the use of satellites. The Canadian Department of Communication had come to the same conclusion, and it agreed to work with NASA in the development of a search-and-rescue satellite-aided tracking program (SARSAT) in 1976. The French Centre National d'Etudes Spatiales joined SARSAT the following year, and the entry of the U.S.S.R. and its COSPAS satellite program in 1980 made the joint project COSPAS-SARSAT.

The first satellite in the project was launched by the Soviet Union on June 30, 1982. The COSPAS II went up the following March, along with the first U.S. SARSAT satellite, to be joined by a second before the end of the year. Ground stations and control centers are now operational in the U.S., Canada, France, the U.S.S.R., Norway, and the United Kingdom.

With the satellites in place, problem number 1, signal visibility, was greatly eased. That left the problem of false alarms, which, if anything, with the new efficiency in picking up ELT signals, grew worse.

Lt. Col. Clark acknowledges the burden that search-and-rescue operations must bear: "Our experience shows that, 98 percent of the time, ELTs are going off not as the result of a distress situation. It's the combination of a bunch of things—just flat neglect on the pilot's part, or perhaps some of the hardware is not as good as it should be. The FAA, FCC, NASA, the Coast Guard, the Air Force, and the Radio Technical Commission for Aeronautics, a group interested in the electronic and aircraft industries who meet to address problems like this, have all been debating the best solution."

Even when the problem of false alarms is not considered, the current system leaves a few things to be desired. To detect a distress signal and pass on the information to ground- or air-based rescue forces, a satellite has to be passing over the transmitting ELT and be within the field of view of an earth station that can receive the information. The satellite does not store any information; instead it acts simply as a radio relay, or "bee." The earth station ascertains the position of the signal and sends it to a central communicating system at the mission control center. The MCC takes that position, looks at a map of who has responsibility for search and rescue in that area, and sends that party the message that there's an ELT going off in their neighborhood.

But by and large, admits Clark, the system is a godsend. "SARSAT takes the long process of redefining the search area and gives us a relatively precise location—about twelve nautical miles from one satellite report. An airplane flying at thirty thousand feet would give us a search radius of three hundred miles.

"We don't want to oversell the thing; we're still very dependent on aircraft reports. While the satellite-generated report does an excellent job of telling where the signal is along the satellite ground track,

GOTO page 170, column 1

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Rescue System

continued from page 169

it can't tell left and right because of the Doppler shift method it employs. It's great for telling you where the thing is in terms of latitude, but it isn't worth a darn in longitude."

At the moment, it appears that help is finally on the way, in the form of the 406-mHz beacon. Using an exclusive, stronger, cleaner frequency than the original 121.5-mHz standard distress frequency model, this new transmitter will enable pilots and mariners in distress not only to send a signal but to include those personal touches that mean so much—manual entry of latitude and longitude and the nature of the emergency. There will be entry codes to indicate "Send pumps," "I'm on fire," or "Someone has appendicitis." The COSPAS-SARSAT satellite, even if not in range of an earth station, should be able to use its onboard recording capability and then dump all the information on its next pass over an earth station, or local user terminal, as they are known in satellite lingo. A new French-designed processor that makes this possible by measuring the Doppler frequency on the spacecraft as well as on the ground eliminates the requirement for mutual visibility of spacecraft and LUT (launch umbilical tower) while a distress transmission is taking place. This processor represents an immediate and considerable savings of money—a reduction of the number of earth stations needed for full global coverage.

The updated ELT has been submitted by the FAA for public comment; the device incorporates the specifications of the Radio Technical Commission for Aeronautics, including a monitor in the cockpit so that a pilot will know when his ELT is activated for any reason.

"Assuming that there is no argument with the proposal, then it will be adapted as a technical standard order," confirms Bernard Geier, manager of the general aviation and commercial division of the FAA. The higher-power, improved-frequency 406-mHz transmitter will then become commercially available for about $500. For the money, the pilot/mariner will get 95 percent probability of signal detection, with a signal accuracy range of within two kilometers and the ability to store up to four hundred distress signals. "At a future time we may require that all aircraft be fitted with the new units only," says Geier, "but that hasn't been determined yet."

"To be really effective," reiterates Clark, "it has to be lightweight, so that you can carry it on an airplane, and the user has to be able to afford it. We don't want another engineering-success-and-operational-failure type of thing."

The FAA's move toward making the superior 406-mHz unit the ELT of choice will have an immediate effect on the SARSAT program. Satellite programs have several stages, known as test, launch, demonstration, transition, and operations.

"The international demonstration phase will end this August," says Fred Flatow, SARSAT mission manager at the Goddard Space Flight Center in Maryland, "but we are planning to continue the demonstration phase with this new experimental 406-mHz system. The 121.5 will probably be discontinued."

Other things will change, too. The use of Hewlett-Packard 1000s at the SARSAT mission control center at Scott Air Force Base, Illinois, is, according to Flatow, one of them. "We are in the process of defining what the ultimate operational ground system should be like, and we are looking at many other computers. We already have two HPs lashed together and are buying a third one, but they are much too small to take care of the job."

The "operational" phase of the program is scheduled to begin officially in 1990. While still "demonstrating," COSPAS-SARSAT has saved 180 lives as of this writing. AC

World Center

continued from page 165

Challenge, a book by French politician and journalist Jean-Jacques Servan-Schreiber. Servan-Schreiber argues that computers will enable those who are intelligent and creative but uneducated to do more with their lives. The center's idealistic attitude stands out from the norm just as its modernistic headquarters stands out from the elegant seventeenth-century buildings that line avenue Matignon.

The center is concerned with the practical implementation of computers and the dissemination of information and knowledge about computers. An example of the latter is a cooperative research program begun in February 1983 with the country of Colombia called "Université à distance." The center has

a similar program with Senegal.

The Centre Mondial's headquarters provides a glimpse of the organization's philosophies in action. Computers, say the center's organizers, should be accessible to everyone, even those who come in off the street. And indeed, as you walk through the center's glass front doors, you enter a large room filled with several brands of microcomputers, available to anyone who chooses to explore their functions and features.

Usually this room is filled with both young and old Parisians exploring Logo, language skills, and other microcomputer applications. It's a kind of high-tech playground for all ages; though, as you'd find at a playground of the more conventional kind, there are often more young people in evidence than older ones. A multilingual receptionist is available to answer questions. The rest of the building houses the administrative personnel of the center.

With the help of people like Raj Reddy, the center's scientific director, the Centre Mondial organizes and implements projects designed to bring the power of computing to the poorer, less-developed nations of the world. Reddy divides his time between overseeing the center's research activities and directing the robotics institute at Carnegie-Mellon University in Pittsburgh, Pennsylvania. The center has assembled about a hundred researchers, several in Paris and the rest scattered around the world, and put at their disposal several powerful computers.

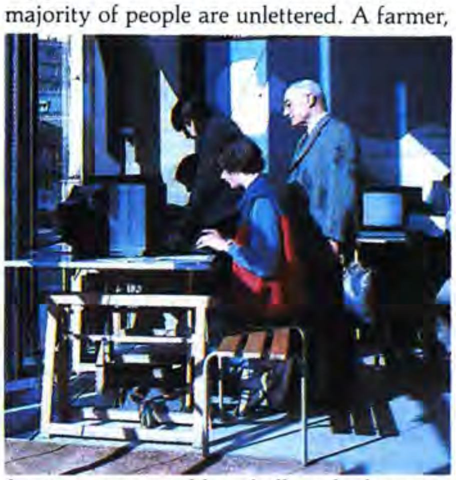
One of the Centre Mondial's most ambitious projects is the development of a computer system to provide medical assistance in the small, extremely poor African nation of Chad. Center scientists have written a program that diagnoses and recommends treatment for leprosy, malnutrition, tuberculosis, meningitis, postabortion infections, and so on. Medical personnel with minimal training merely answer simple questions posed by the computer about a patient's medical history and symptoms.

The center is currently adapting the program to run on a battery-powered notebook-sized portable computer. A further enhancement of the system would be the use of Smart Cards—French-developed credit cards with microprocessors that store information. Each patient of a particular clinic would be issued a card containing his or her medical history stored on a chip. Then, when a patient returned to a clinic, only the most recent information would have to be entered. The computer system in Chad—which should be implemented late this year—addresses the problem of native medical personnel leaving a poor country once they are trained. Once the system is installed, the computers will not be transient, and training new personnel to use them will be a simple matter.

The Centre Mondial has also donated a number of microcomputers to educational experiments in France and other countries. Last year, fifty computers were put at the disposal of youngsters in a tough Marseille neighborhood. This effort has helped to reduce juvenile delinquency there. Another program begun late last year involves taking the five hundred brightest graduates of French technical schools and having them teach computer skills to the unemployed as part of the graduates' required year of military duty.

After a somewhat shaky start—the two principal scientists of the center, whose MIT credentials added credibility to the center, quit as a result of disagreements over how the center should be run—the Center Mondial seems to be accomplishing some of the goals that were set at its inception. But, according to Reddy, the true harvest is still to come.

Researchers at the Centre Mondial are convinced that as computer technology advances there will be even more effective ways to aid those who stand to benefit the most. They see voice synthesis and analysis as having promise in the Third World, where the majority of people are unlettered. A farmer,



for instance, would verbally ask the computer for information on planting techniques and get the answer through a voice synthesizer. Since the problems of language and localizing hardware could be virtually eliminated, the sharing of technology would happen much faster.

Reddy himself grew up in a poor farming village near Madras in India. His rise to the position of an international authority on robots and computers is the kind of scenario that the center would like to see happen for others like him who may not otherwise get the opportunity to develop and use their abilities. The Centre Mondial Informatique et Ressource Humaine is an ambitious group, the results of whose efforts should be in evidence for many years to come. DH

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Δ **A Buck, a Franc, a Yen, a Pound.** The Department of Commerce is making economic reports available to U.S. businesspeople who are engaged in selling computers and peripherals overseas. The reports, which vary in length and price, describe market size, trends, and prospects for makers of mainframes, plotters, card readers, modems, and the like. Publication dates of the available reports range from 1977 to 1983. Newly gathered data to be published this year, however, will pinpoint export markets for minis and micros in fourteen countries and software and services prospects in five—France, Finland, Norway, the Netherlands, and the United Kingdom. The research is carried out by consultants, working under contract and aided by U.S. embassy personnel. The information is assembled from government statistics, specialized periodicals, and interviews with trade associations and computer firms based in the country in question. The reports cover about two-thirds of the approximately three dozen nations with which the United States encourages high-technology trade. Prices range from $10 for twelve-page summaries on a single country to $176 for an exhaustive document containing profiles of twenty-two nations. Midsize in-depth studies of a single country run $50 to $160. For a free catalog, contact the U.S. Department of Commerce's International Trade Administration or any ITA district office.

Δ **Big Brother's Books Are Watching You.** Since last month's Newspeak feature on Orwell and *Nineteen Eighty-four*, three more publications concerning the English author and his dystopian novel have come to our attention. *The Big Brother Book of Lists*, published by Price/Stern/Sloan, is a collection of 147 lists, ninety anecdotes, thirty-seven quotes, nine chronologies, three dozen glossaries, and a dozen Conrad and Mauldin cartoons on the invasion of privacy. *On Nineteen Eighty-four*, edited by Peter Stansky and published by W.H. Freeman and Company, includes twenty-two essays by Stanford professors comparing today's realities and Orwell's vision. *1984: Spring, A Choice of Futures*, written by Arthur C. Clarke and published in hardcover by Del Rey, is a collection of past speeches and essays that suggest a considerably less ominous view than Orwell's.

Δ **Winston Smith Meets Caligula.** As reported in last month's Newspeak, production has started in England on a new film version of *Nineteen Eighty-four*. What we didn't report is that John Hurt (*Alien*, *The Elephant Man*, *I, Claudius*) has been signed to play the role of Winston Smith, the story's protagonist.

Δ **Lab Computing.** *Science Magazine*, in conjunction with Scherago Associates, is sponsoring the Second Conference on Computers in Science, to be held October 28 through November 1 in Washington, D.C. The conference will emphasize the use of the workstation for scientists in such fields as biology and molecular design. There will be invited talks on artificial intelligence, laboratory automation and robotics, and management of an electronic laboratory. The conference will also feature a number of workshops and a large vendor exhibition. Abstracts for prospective papers are still being considered. For more information, contact Scherago Associates in New York City.

Δ **Heroic Hints.** Indianapolis, Indiana-based Howard W. Sams has released *Hero 1: Advanced Programming and Interfacing* by Mark J. Robillard. The 234-page book covers custom programming and modifying of Heath's ET-18 Hero 1 educational robot. Robillard's book features in-depth analysis of the Hero operating system and firmware, and other technical information.

Δ**What's Up, Doc?** MEDCOM, the First National Conference on Computers in Medical Practices will be held in San Francisco June 23 through 25 at the California Masonic Memorial Temple. MEDCOM is designed specifically for medical practice management computing. Attendees will have the opportunity to compare combinations of systems offered by leading medical hardware and software developers. At the same location June 26 through 28, DENTCOM, the First National Conference on Computers in Dental Practices, will be held. DENTCOM is to dentists what MEDCOM is to doctors. For more information, contact the sponsor of both shows, TEC/Helix, located in San Francisco. ▲

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THE RIGHT TO ASSEMBLE

by Ray Duncan

The DUMP Utility

This month's little utility allows you to dump the binary contents of a file in both hexadecimal and ASCII formats. The output of the program can be directed to the video display, the printer, another file, or any other device known to PC-DOS; it can also be piped to another program.

DUMP is useful for such arcane purposes as examining the structure of unknown data files and getting compact object code printouts of programs for debugging purposes. An example of DUMP's output is shown in figure 1.

DUMP illustrates the use of the redirectable standard output device and nonredirectable standard error device. It fully supports pathnames and requires PC-DOS or MS-DOS 2.0. Although the program was coded from scratch, it is highly similar in function to the Dump.com, a program that for many years has been distributed with Digital Research CP/M.

How To Use DUMP

Your command to display the contents of a file should have the syntax:

A>DUMP drive:path\filename.ext [>device]

The drive defaults to the current disk unit, and the path defaults to the current subdirectory. If the optional redirection command—shown in square brackets above—is not present, the program's output appears on the video display.

Here's a simple example. To dump the contents of the file Xyz.dat to the system printer, you would enter:

A>DUMP XYZ.DAT >PRN:

You can suspend the output of the program by typing control-S, and you can abort the dump altogether by entering control-break.

DUMP may present you with four different error messages. "Cannot find input file" means either that the file doesn't exist in the specified subdirectory or that the path or drive specification given is invalid. The meaning of the "Missing file name" message is obvious. "Requires PC-DOS 2.0" means either that you're trying to execute DUMP under PC-DOS or MS-DOS 1.x or that your operating system is an MS-DOS clone that isn't quite compatible enough. "Empty file" signifies that the specified file has been found but contains no data.

Outline of DUMP's Logic

The control logic of the DUMP utility is completely contained within the procedure *dump*. It may be summarized as follows:

1. Make sure the operating system version is PC-DOS 2.0; if it isn't, print an error message and exit.

2. Check if a filename is present in the command line; if none is there, print an error message and depart.

3. Try to open the file; if unsuccessful,

Come in late on "The Right to Assemble"? All back issues of the column—from February 1983—are still available; for further information, *see page 4.*

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print an error message and quit.

4. Read the first record of the file into the deblocking buffer; if no data is read, assume the file is empty, print an error message, and exit.

5. Get a character from the input file. If end of file has been reached, go to 11.

6. If the current file offset is evenly divisible by the record length (set by the equate *blksize*), print the record number and heading for a block of data.

7. If the current file offset is evenly divisible by sixteen, then we're starting a new output line: Convert the file offset to ASCII and place it into the output string.

8. Convert the current data byte from the input file to ASCII and place it in the output string.

9. If sixteen bytes have been converted, send the output string to the standard output device.

10. Go to 5 to get the next character from the input file.

11. End of file; close the input file and return to DOS.

Internals of DUMP

Like all the other utilities presented in this column in recent months, DUMP is written to be assembled into an EXE file. It has three segments: a CODE segment (lines 29 through 286), which contains all of the executable machine code; a DATA segment (lines 289 through 368), which holds the program's variables and strings; and a STACK segment, defined by lines 371 through 376.

In our usual style, we start the program by grouping together all of our equates. First, for convenience and to make the listing easier to read, we give symbolic names to a few ASCII codes—blank, carriage return, and line feed. We then declare the offset of the "command line tail" in the Program Segment Prefix that is set up by PC-DOS. We give a value to the name BLKSIZE, which specifies the size of the records we'll be reading from the input file.

Finally, we give names to the values that DOS has predefined as "handles" for the standard output device and standard error device. Handles, which are tokens that may be used to access devices or files that have been successfully attached by a program, were introduced with DOS 2.0 as part of that system's new Unix-like layer of functionality. See page D-15 of the PC-DOS 2.0 manual for further information.

The DUMP utility contains one large procedure, named *dump*, that implements the logic of the program. This procedure, which follows very closely the outline given in the previous section, calls many smaller procedures as subroutines.

The procedures *get_filename*, *open_input*, *close_input*, and *get_char* are transplanted into DUMP without significant change from previous months' utility programs. This demonstrates the time that may be saved by writing short, clear modules that can be used over and over. The routine *read_block* was modified only slightly from last month's program in order to make it accept a partial record at the end of the file.

Write_Std is called with the address and length of an ASCII string, which it sends to the standard output device—or to wherever it may have been redirected. Similarly, *write_error* sends a string to the standard error device; under PC-DOS this device is not redirectable, so error messages from DUMP will always appear on the video display. *Print_heading* formats the record number and header and calls *write_std* to send this information to the standard output.

Now we come to three completely new (for the purposes of this column) routines that have broad usefulness and serve as a miniexample of bottom-up design. The procedure *ascii* converts the low four bits of the AL register into an equivalent hexadecimal ASCII character; in other words, a binary value in the range 0 through F is converted into an ASCII code in the range 30H through 39H or 41H through 46H.

Conv_byte calls *ascii* twice to convert eight bits of data into two hex ASCII characters, and *conv_word* calls *conv_byte* twice to translate sixteen bits of binary into four hex ASCII characters. *Conv_byte* is used by the main program to format the actual binary contents of the file, while *conv_word* is called to convert the record number and file offset. The address of the output string is passed in register DI; this is very convenient, since it lets us use the string instruction STOSB to store the character and increment the output pointer in a single operation.

Next month, we'll have a tutorial on the shift and rotate class of instructions; then we'll present a program that demonstrates the conversion of sixteen- and thirty-two-bit binary numbers into decimal ASCII—along with some other useful tricks.

Remember, if you're a CompuServe subscriber, you can download the source for this month's utility from the Programming Database on the IBM PC Special Interest Group. Enter *GO PCS-131* at the first ! prompt, then *XA 4* for access to the database. ▲

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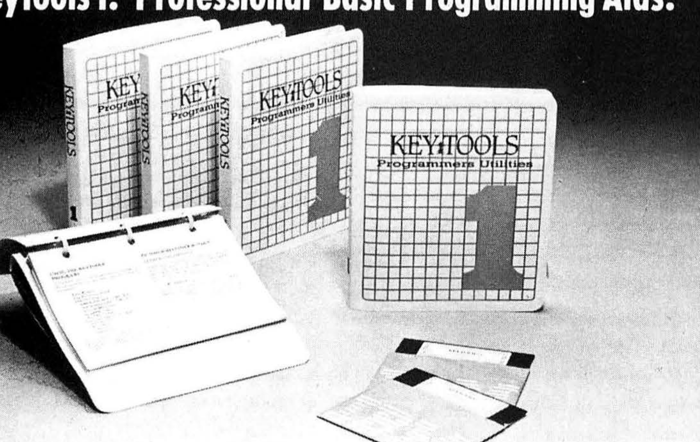

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```
Record 0001
      0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
0000  61 73 6D 20 25 31 2C 25 31 2C 25 31 2C 25 31 0D   asm %1,%1,%1,%1.
0010  0A 6C 69 6E 6B 20 25 31 2C 25 31 2C 2C 2C 0D 0A   .link %1,%1,,,..
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0040  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0050  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0060  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0070  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
```

Figure 1. Typical output of the DUMP utility. Each 128-byte record of the file is numbered in hex, and the relative file offset in hex is given at the beginning of each line. The contents of the file are displayed in sixteen-byte groups. Bytes that correspond to a printable ASCII code are displayed as characters at the right end of the line, while nonprintable codes are indicated with periods.

```
                            name      dump
                            page      55,132
                            title     DUMP --- Display File Contents

                            ; DUMP --- a utility to display the contents of a file in hex
                            ; and ASCII format. Requires PC-DOS 2.0 or MS-DOS 2.0.

                            ; Used in the form:
                            ; A>dump path\filename.ext [ >device ]
                            ; (item in square brackets is optional)

                            ; version 1.0 March 25, 1984
                            ; Copyright (c) 1984 by Ray Duncan
                            ; May be freely reproduced for noncommercial use.

 = 000D                     cr              equ     0dh       ;ASCII carriage return
 = 000A                     lf              equ     0ah       ;ASCII line feed
 = 0020                     blank           equ     20h       ;ASCII space code

 = 0080                     command         equ     80h       ;buffer for command tail

 = 0080                     blksize         equ     128       ;size of input file records

 = 0001                     output_handle   equ     1         ;handle of standard output device
                                                              ;(can be redirected)
 = 0002                     error_handle    equ     2         ;handle of standard error device
                                                              ;(not redirectable)

 0000                       cseg            segment para public 'CODE'

                                            assume cs:cseg,ds:data,es:data,ss:stack


 0000                       dump            proc    far       ;entry point from PC-DOS

 0000   1E                                  push    ds        ;save DS:0000 for final
 0001   33 C0                               xor     ax,ax     ;return to PC-DOS
 0003   50                                  push    ax
 0004   B8 ---- R                           mov     ax,data   ;make our data segment
 0007   8E C0                               mov     es,ax     ;addressable via ES register.
 0009   B4 30                               mov     ah,30h    ;check version of PC-DOS.
 000B   CD 21                               int     21h
 000D   3C 02                               cmp     al,2
 000F   73 0C                               jae     dump1     ;proceed, DOS 2.0 or greater.
 0011   BA 018A R                           mov     dx,offset msg3  ;DOS 1.x -- print error message;
 0014   8C C0                               mov     ax,es     ;we must use the old PC-DOS
 0016   8E D8                               mov     ds,ax     ;string output function since
 0018   B4 09                               mov     ah,9      ;handles are not available in
 001A   CD 21                               int     21h       ;this version of PC-DOS.
 001C   CB                                  ret

 001D   E8 00A8 R       dump1:              call    get_filename    ;get path and file spec. for
                                                              ;input file from command line tail.
 0020   8C C0                               mov     ax,es     ;set DS = ES for remainder
 0022   8E D8                               mov     ds,ax     ;of program.
 0024   73 0A                               jnc     dump2     ;jump, got acceptable name.
 0026   BA 0174 R                           mov     dx,offset msg2  ;missing or illegal filespec.
 0029   B9 0016 90                          mov     cx,msg2_length
 002D   EB 75 90                            jmp     dump9     ;print error message and exit.

 0030   E8 00CB R       dump2:              call    open_input      ;now try to open input file
 0033   73 0A                               jnc     dump3     ;jump, opened input ok
 0035   BA 0159 R                           mov     dx,offset msg1  ;open of input file failed,
 0038   B9 001B 90                          mov     cx,msg1_length
 003C   EB 66 90                            jmp     dump9     ;print error msg and exit.

 003F   E8 0101 R       dump3:              call    read_block      ;initialize input file buffer
 0042   73 0A                               jnc     dump4     ;jump, got a block
 0044   BA 01B4 R                           mov     dx,offset msg4  pty file, print error
 0047   B9 000F 90                          mov     cx,msg4_length
 004B   EB 57 90                            jmp     dump9     ;message and exit


                                                              ;file successfully opened,
 004E                   dump4:                                ;now convert and display it!
 004E   E8 00E1 R                           call    get_char  ;read 1 character from input.
 0051   72 4D                               jc      dump8     ;jump, end of file
 0053   FF 06 0044 R                        inc     input_addr      ;update relative file position
 0057   0B DB                               or      bx,bx     ;is this 1st char of block?
 0059   75 03                               jnz     dump5     ;no
 005B   E8 012F R                           call    print_heading
 005E   81 E3 000F      dump5:              and     bx,0fh    ;is this first byte of 16?
 0062   75 0B                               jnz     dump6     ;no, jump
 0064   50                                  push    ax        ;save the byte
 0065   BF 0048 R                           mov     di,offset output  ;convert relative file addr.
 0068   A1 0044 R                           mov     ax,input_addr     ;for output string
 006B   E8 0147 R                           call    conv_word
 006E   58                                  pop     ax
 006F                   dump6:                                ;store ASCII version of character,
                                                              ;if it is alphanumeric.
 006F   BF 007F R                           mov     di,offset outputb
 0072   03 FB                               add     di,bx     ;calculate output string address
 0074   C6 05 2E                            mov     byte ptr [di],'.'  ;if it is control character,
 0077   3C 20                               cmp     al,blank  ;just print a dot.
 0079   72 06                               jb      dump7     ;jump, not alphanumeric.
 007B   3C 7E                               cmp     al,7eh
 007D   77 02                               ja      dump7     ;jump, not alphanumeric.
 007F   88 05                               mov     [di],al   ;store ASCII character.
 0081                   dump7:                                ;now convert binary byte
                                                              ;to hex ASCII equivalent.
 0081   53                                  push    bx        ;save offset 0-15 of this byte.
                                                              ;calc. its position in
                                                              ;output string.
 0082   BF 004E R                           mov     di,offset outputa
 0085   03 FB                               add     di,bx     ;base addr + (offset*3)
 0087   03 FB                               add     di,bx
 0089   03 FB                               add     di,bx
 008B   E8 0152 R                           call    conv_byte ;convert data byte to hex
 008E   5B                                  pop     bx        ;restore byte offset
 008F   83 FB 0F                            cmp     bx,0fh    ;16 bytes converted yet?
 0092   75 BA                               jne     dump4     ;no, get another byte
 0094   BA 0048 R                           mov     dx,offset output
 0097   B9 0049 90                          mov     cx,output_length
 009B   E8 011F R                           call    write_std ;yes, print the line
 009E   EB AE                               jmp     dump4     ;get next char. from input file.
```


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```
00A0                 dump8:                               ;end of file detected.
00A0  E8 00D8 R                    call  close_input      ;close input file.
00A3  CB                           ret                    ;now return to PC-DOS.
                                                          ;come here to print message
00A4                 dump9:                               ;on standard error device,
00A4  E8 0127 R                    call  write_error      ;and return control to PC-DOS
00A7  CB                           ret
00A8                 dump          endp
00A8                 get_filename  proc  near             ;process name of input file
                                                          ;return Carry = 0 if successful
                                                          ;return Carry = 1 if no filename
                                                          ;DS:SI <- addr command line
00A8  BE 0080                      mov   si,offset command
                                                          ;ES:DI <- addr filespec buffer
00AB  BF 0000 R                    mov   di,offset input_name
00AE  FC                           cld
00AF  AC                           lodsb                  ;any command line present?
00B0  0A C0                        or    al,al            ;return error status if not.
00B2  74 15                        jz    get_filename4
00B4                 get_filename1:                       ;scan over leading blanks
00B4  AC                           lodsb                  ;to file name.
00B5  3C 0D                        cmp   al,cr            ;if we hit carriage return...
00B7  74 10                        je    get_filename4    ;jump, name is missing
00B9  3C 20                        cmp   al,20h           ;is this a blank?
00BB  74 F7                        jz    get_filename1    ;if so keep scanning.
00BD                 get_filename2:                       ;found first char of name,
00BD  AA                           stosb                  ;move last char. to output
                                                          ;file name buffer.
00BE  AC                           lodsb                  ;check next character, found
00BF  3C 0D                        cmp   al,cr            ;carriage return yet?
00C1  74 04                        je    get_filename3    ;yes, exit with success code.
00C3  3C 20                        cmp   al,20h           ;is this a blank?
00C5  75 F6                        jne   get_filename2    ;if not keep moving chars.
00C7                 get_filename3:                       ;exit with carry = 0
00C7  F8                           clc                    ;for success flag
00C8  C3                           ret
00C9                 get_filename4:                       ;exit with carry = 1
00C9  F9                           stc                    ;for error flag
00CA  C3                           ret
00CB                 get_filename  endp
00CB                 open_input    proc  near             ;open input file
                                                          ;DS:DX = addr filename
00CB  BA 0000 R                    mov   dx,offset input_name
00CE  B0 00                        mov   al,0             ;AL = 0 for read only
00D0  B4 3D                        mov   ah,3dh           ;function 3dh = open
00D2  CD 21                        int   21h              ;handle returned in AX.
00D4  A3 0040 R                    mov   input_handle,ax  ;save it for later.
00D7  C3                           ret                    ;CY is set if error
00D8                 open_input    endp
00D8                 close_input   proc  near             ;close input file
00D8  8B 1E 0040 R                 mov   bx,input_handle  ;BX = handle
00DC  B4 3E                        mov   ah,3eh
00DE  CD 21                        int   21h
00E0  C3                           ret
00E1                 close_input   endp
00E1                 get_char      proc  near             ;get one character from input buffer
                                                          ;return AL = char, BX = buffer offset
                                                          ;return CY flag = 1 if end of file
00E1  8B 1E 0042 R                 mov   bx,input_ptr     ;is pointer at end of buffer?
00E5  81 FB 0080                   cmp   bx,blksize
00E9  75 0C                        jne   get_char1        ;no, jump
                                                          ;yes, buffer is exhausted,
00EB  C7 06 0042 R 0000            mov   input_ptr,0
00F1  E8 0101 R                    call  read_block       ;new block must be read from disk.
00F4  73 EB                        jnc   get_char         ;got block, start routine over.
00F6  C3                           ret                    end of file detected
                                                          ;so return CY flag = True.
00F7                 get_char1:                           ;get data byte into AL.
00F7  8A 87 00D9 R                 mov   al,[input_buffer + bx]
00FB  FF 06 0042 R                 inc   input_ptr        ;bump input buffer pointer.
00FF  F8                           clc                    ;return CY flag = 0 since
0100  C3                           ret                    ;not end of file.
0101                 get_char      endp
0101                 read_block    proc  near             ;read block of data from input file.
                                                          ;return CY flag = 0 if read ok.
                                                          ; CY flag = 1 if end of file.
0101  8B 1E 0040 R                 mov   bx,input_handle  ;request read from PC-DOS.
0105  B9 0080                      mov   cx,blksize
0108  BA 00D9 R                    mov   dx,offset input_buffer
010B  B4 3F                        mov   ah,3fh
010D  CD 21                        int   21h
                                                          ;initialize pointers
010F  FF 06 0046 R                 inc   input_block
0113  C7 06 0042 R 0000            mov   input_ptr,0
0119  0B C0                        or    ax,ax            ;was anything read in? (the OR
                                                          ; incidentally turns off the CY flag)
011B  75 01                        jnz   read_block1      ;yes, jump
011D  F9                           stc                    ;no, end of file so return CY = True
011E                 read_block1:
011E  C3                           ret
011F                 read_block    endp
011F                 write_std     proc  near             ;write string to standard output.
                                                          ;call DX = addr of output string
                                                          ;CX = length of string
011F  BB 0001                      mov   bx,output_handle ;BX = handle for standard list device.
0122  B4 40                        mov   ah,40h           ;function 40h = write to device.
0124  CD 21                        int   21h              ;request service from DOS.
0126  C3                           ret
0127                 write_std     endp
0127                 write_error   proc  near             ;write string to standard error device.
                                                          ;call DX = addr of output string
                                                          ;CX = length of string
0127  BB 0002                      mov   bx,error_handle  ;BX = handle for standard error device.
012A  B4 40                        mov   ah,40h           ;function 40h = write to device.
012C  CD 21                        int   21h              ;request service from DOS.
012E  C3                           ret
012F                 write_error   endp
012F                 print_heading proc  near             ;print record number and heading
012F  50                           push  ax               ;for a block of data
0130  53                           push  bx               ;first save registers
0131  BF 009A R                    mov   di,offset headinga
0134  A1 0046 R                    mov   ax,input_block
0137  E8 0147 R                    call  conv_word        ;convert record number to ASCII
013A  BA 0091 R                    mov   dx,offset heading
013D  B9 0048 90                   mov   cx,heading_length
0141  E8 011F R                    call  write_std        ;now print heading
0144  5B                           pop   bx               ;restore registers
0145  58                           pop   ax
0146  C3                           ret                    ;and exit
0147                 print_heading endp
0147                 conv_word     proc  near             ;convert 16-bit binary word
                                                          ; to hex ASCII
                                                          ;call with AX = binary value
                                                          ;DI = addr to store string
                                                          ;returns AX, DI, CX destroyed
0147  50                           push  ax
0148  8A C4                        mov   al,ah
014A  E8 0152 R                    call  conv_byte        ;convert upper byte
014D  58                           pop   ax
014E  E8 0152 R                    call  conv_byte        ;convert lower byte
0151  C3                           ret
0152                 conv_word     endp
0152                 conv_byte     proc  near             ;convert binary byte to hex ASCII
                                                          ;call with AL = binary value
                                                          ;DI = addr to store string
                                                          ;returns AX, DI, CX modified
0152  2A E4                        sub   ah,ah            ;clear upper byte
0154  B1 10                        mov   cl,16
0156  F6 F1                        div   cl               ;divide binary data by 16
0158  E8 0163 R                    call  ascii            ;the quotient becomes the first
015B  AA                           stosb                  ;ASCII character
015C  8A C4                        mov   al,ah
015E  E8 0163 R                    call  ascii            ;the remainder becomes the
0161  AA                           stosb                  ;second ASCII character
0162  C3                           ret
0163                 conv_byte     endp
0163                 ascii         proc  near             ;convert bottom 4 bits in AL
0163  04 30                        add   al,'0'           ;into the hex ASCII character
0165  3C 39                        cmp   al,'9'
0167  7E 02                        jle   ascii2           ;jump if in range 0-9,
0169  04 07                        add   al,'A'-'9'-1     ;offset it to range A-F
016B  C3                           ascii2: ret            ;return ASCII char. in AL.
016C                 ascii         endp
016C                 cseg          ends
0000                 data          segment para public 'DATA'
0000  40 [           input_name    db    64 dup (0)       ;buffer for input filespec
          00
             ]
0040  0000           input_handle  dw    0                ;token from PCDOS for input file.
0042  0000           input_ptr     dw    0                ;pointer to input deblocking buffer
0044  FFFF           input_addr    dw    = ;pl = n = ;pl1 ;relative address in file
0046  0000           input_block   dw    0                ;current 128 byte block number
0048  6E 6E 6E 6E 20 20  output    db    'nnnn',blank,blank
004E  10 [           outputa       db    16 dup ('00',blank)
          30 30
          20
             ]
007E  20                           blank
007F  30 31 32 33 34 35  outputb   db    '0123456789ABCDEF',cr,lf
      36 37 38 39 41 42
      43 44 45 46 0D 0A
= 0049               output_length equ   $-output
0091  0D 0A 52 65 63 6F  heading   db    cr,lf,'Record',blank
      72 64 20
009A  6E 6E 6E 6E 20 20  headinga  db    'nnnn',blank,blank,cr,lf
      0D 0A
00A2  07 [           db            7     dup (blank)
          20
             ]
00A9  30 20 20 31 20 20            db    '0 1 2 3 4 5 6 7 '
      32 20 20 33 20 20
      34 20 20 35 20 20
      36 20 20 37 20 20
00C1  38 20 20 39 20 20            db    '8 9 A B C D E F',cr,lf
      41 20 20 42 20 20
      43 20 20 44 20 20
      45 20 20 46 0D 0A
= 0048               heading_length equ  $-heading
00D9  80 [           input_buffer  db    blksize dup (?)  ;deblocking buffer for input file
          ??
             ]
0159  0D 0A          msg1          db    cr,lf
015B  43 61 6E 6E 6F 74            db    'Cannot find input file.'
      20 66 69 6E 64 20
      69 6E 70 75 74 20
      66 69 6C 65 2E
0172  0D 0A                        db    cr,lf
= 001B               msg1_length   equ   $-msg1
0174  0D 0A          msg2          db    cr,lf
0176  4D 69 73 73 69 6E            db    'Missing file name.'
      67 20 66 69 6C 65
      20 6E 61 6D 65 2E
0188  0D 0A                        db    cr,lf
= 0016               msg2_length   equ   $-msg2
018A  0D 0A          msg3          db    cr,lf
018C  52 65 71 75 69 72            db    'Requires PC-DOS version 2 or greater.'
      65 73 20 50 43 2D
      44 4F 53 20 76 65
      72 73 69 6F 6E 20
      32 20 6F 72 20 67
      72 65 61 74 65 72
      2E
01B1  0D 0A 24                     db    cr,lf,'$'
01B4  0D 0A 45 6D 70 74  msg4      db    cr,lf,'Empty file.',cr,lf
      79 20 66 69 6C 65
      2E 0D 0A
= 000F               msg4_length   equ   $-msg4
01C3                 data          ends
0000                 stack         segment para stack 'STACK'
0000  40 [                         db    64 dup (?)
          ??
             ]
0040                 stack         ends
                                   end   dump
```

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softalk presents the bestsellers

The biggest shakeup since July 1983 hit the Top Thirty in March, as eight new products jumped onto the list. Oddly enough, that both understates and overstates the magnitude of the ongoing change occurring in the IBM and IBM-compatible software market.

There's certainly no change at the top of the list. *1-2-3* not only maintains its firm grasp on first place but has received renewed interest with the announcement of *Symphony. 1-2-3* is now selling at three times the rate of second-place *Microsoft Flight Simulator.*

At this point, the success of *1-2-3* almost defies elaboration. The hold it has on the PC market compares favorably with the dominant position of IBM itself in the mainframe market. If there was such a list as the seven wonders of the electronic age, *1-2-3* would definitely be on it. The other six members would be a matter for heated debate.

Ashton-Tate's *dBase II* remains the leading database product, although *Friday!* is meeting with indifference in the PC marketplace. Software Publishing Corporation has two leaders; *PFS:File* holds firm as the top file handler, and *PFS:Write* remains atop the word processing lists.

Some of the shuffling within the Top Thirty was also more cosmetic than revolutionary. *WordStar* rebounded from its fifteenth-place finish in February to capture sixth place and come within an eyelash of unseating *PFS:Write. Typing Tutor* passed *MasterType* as the leading instructional program in the PC market. *Multiplan* made significant gains, resurfacing in the top ten.

It appears that *WordStar*'s resurgence came at the expense of the other major contenders. Two things are notable about the performance of *WordPerfect, MultiMate,* and *Word.* First, their drop in the Top Thirty was attributable more to the effect of PC*jr* owners' software purchases than to their position vis-à-vis other PC products. Second, all three programs lost ground in their pursuit of *WordStar.* Last month the difference between the four programs was just a whisker; this month it's more like a mile.

Some of the programs joining the Top Thirty in March were old-timers coming back, rather than total newcomers. *Asynchronous Communications Support 2.0,* after slipping off the Top Thirty, rebounded to fifteenth. That's representative of a renewed interest in communications that was also reflected in *Crosstalk*'s long jump from twenty-seventh to twelfth.

General Accounting, a BPI package sold by IBM, came back to nineteenth after some months off the list. What's so surprising is that the same company's *General Ledger* was seventeenth.

Another old-timer finding renewed interest was *Macro Assembler,* which came in twenty-second.

On the other hand, some of the newcomers represent significant challenges to the established order.

Even as *Multiplan* was showing more strongly, *VisiCalc: Advanced Version* jumped onto the charts at twenty-seventh. That's the first Top Thirty showing for the enhanced version of the pioneer spreadsheet program and indicates that Software Arts may be a marketing force to be reckoned with. Had sales of *VisiCalc* and *VisiCalc: Advanced Version* been combined, they would have rated eighteenth in March.

Dollars and Sense, a new personal accounting package from Monogram, also made its first appearance. It's been doing relatively well in other markets but finds itself in a familiar position as it gains acceptance among PC owners: It's still the runner-up to *Home Accountant Plus.*

Other changes in the list reflect the impact of PC*jr.* Some programs, such as *Zork I, Zork II,* and *Deadline,* are stronger because of added sales from Junior owners. In addition, home owners can be credited

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with pushing some programs onto the Top Thirty.

Early Games for Young Children jumped into a tie for twentieth. It's a program that hovered around the Top Thirty without breaking through until the Junior attracted more home buyers. The *Early Games* showing is the highest in the history of the PC for an educational product other than a typing instructor or a training program.

Tied with *Early Games for Young Children* was *Frogger*. *Frogger* made a couple of appearances near the bottom of the Top Thirty last year, but sales had dwindled until Junior owners brought about its resuscitation.

Another indication of the increasing impact of IBM and IBM-compatible machines on the home marketplace was the presence of *Computer SAT*, from Harcourt Brace Jovanovich in twenty-eighth place. In an educational niche that's crowded with hopefuls in every computer market, HBJ's entry has stood head and shoulders above the competition in sales, so it's no surprise that it's captured the early PC lead.

The biggest disappointment among March results was the failure of tax preparation and planning packages to fulfill the promise indicated by February results. Instead of showing sales headed toward a peak, they flattened out. *Tax Advantage* from Continental led the pack in March, with *Tax Preparer* and *Tax Manager* trailing. ▲

IBM-franchised retail stores representing approximately 5.31 percent of all sales of IBM and IBM-related Personal Computer products volunteered to participate in the poll.

Respondents were contacted early in April to ascertain their sales for the month of March.

The only criterion for inclusion on the list was the number of units sold; such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in April respresented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 2.95 percent, which translates roughly into the theoretical possibility of a change of 3.14 points, plus or minus, in any index number.

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the top thirty

This Month	Last Month	Index	
1	1	357.79	**1-2-3**, Mitch Kapor and Jonathan Sachs; Lotus Development
2	2	98.35	**Microsoft Flight Simulator**, Bruce Artwick; Microsoft
3	5	87.66	**dBase II**, Wayne Ratliff; Ashton-Tate
4	3	68.06	**PFS:File**, John Page and D.D. Roberts; Software Publishing Corporation
5	6	63.07	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell; Software Publishing Corporation
6	15	62.36	**WordStar**; MicroPro
7	12	45.97	**Typing Tutor**, Michael Sierchio (Dick Ainsworth and Al Baker); IBM (Microsoft)
8	8	38.48	**PFS:Report**, John Page; Software Publishing Corporation
9	17	37.41	**Multiplan**; Microsoft
10	11	37.05	**Copy II Plus**; Central Point Software
11	16	34.21	**Zork I**; Infocom
12	27	32.07	**Crosstalk**; Microstuf
13	9	29.57	**Home Accountant Plus**, Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
	30	29.57	**Deadline**; Infocom
15	—	25.30	**Asynchronous Communications Support 2.0**; IBM
16	7	24.94	**Basic Compiler**, Microsoft; IBM
17	25	23.87	**General Ledger**, John Moss and Ken Debower; IBM (BPI)
18	4	23.16	**MasterType**, Bruce Zweig; Scarborough Systems
19	—	22.45	**General Accounting**, John Moss and Ken Debower; IBM (BPI)
20	—	20.66	**Early Games for Young Children**, John Paulson; Counterpoint Software
	—	20.66	**Frogger**, Olaf Lubeck; Sierra On-Line
22	—	19.60	**Macro Assembler**, Microsoft; IBM
	—	19.60	**Dollars and Sense**, Frank E. Mullin; Monogram
24	30	18.88	**Zork II**; Infocom
	20	18.88	**WordPerfect**, Alan Ashton and Bruce Bastian; Satellite Software
26	18	17.46	**MultiMate**; MultiMate International
27	—	15.32	**VisiCalc: Advanced Version**, Dan Bricklin and Robert Frankston; Software Arts
28	—	12.47	**Computer SAT**; Harcourt Brace Jovanovich
29	23	11.40	**Word**; Microsoft
	23	11.40	**Norton Utilities**, Peter Norton; Peter Norton Inc.

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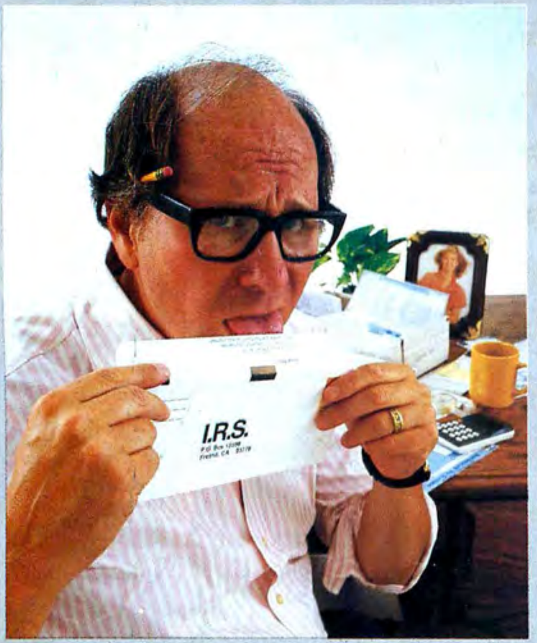

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